NBSIR 73-235

FIELD SERVICE TEST MODEL: COMPUTER-CONTROLLED U SYSTEM. OPERATIONS MANUAL AND SOFTWARE OPERATING SYSTEM APPENDICES FOR THE AUTOMATED SYSTEM. VOLUME II.

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July 11, 1973

Instruction Manual

Prepared for
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FIELD SERVICE TEST MODEL: COMPUTER-CONTROLLED U SYSTEM

OPERATIONS MANUAL AND SOFTWARE OPERATING SYSTEM APPENDICES FOR THE AUTOMATED SYSTEM

VOLUME II

INTRODUCTION

Volume II of the "Automated U System" describes the software listings and the operator's manual. This volume is intended to instruct the station technician in the procedure to load programs and operate, under computer control, the automated U system. Other manuals describe the system and the technical design and are contained in the following manuals:

Volume I. Field Service Test Model: Computer-Controlled U System. Operations Manual and Software Operating System Appendices for the Automated System.

Field Service Test Model: Computer-Controlled U System. Manual for Receiver and ADACS Interface Chassis.

Field Service Test Model: Computer-Controlled U System. Manual for Test Unit.

Field Service Test Model: Computer-Controlled U System. Manual for Computer Subsystem.

Field Service Test Model: Computer-Controlled U System. Manual for System.

Certain commercial equipment and materials are identified in this paper in order to adequately specify the components used. In no case does such identification imply recommendation or endorsement by the National Bureau of Standards, nor does it imply that the material or equipment identified is necessarily the vest available for the purpose.

APPENDIX I

INT/EXT CROSS REFERENCE TABLE

	E$INT	E$SKD	E$TSI	E$CLK	E$UIN	E$SUB	E$OMI	E$T28	E$T35	E$MAG	U$RTA	U$LSQ	U$TGR	U$WFA	U$DAT	U$REP	U$RED	U$PST	M$ESC	M$LEV	M$STD	E$LOG	E$BDC	E$FRT	E$DIF	E$FMF	E$SRT	F$FMT	F$DMP
B:IOR			I																									X	X
B:ORT		X				I																							
B.RET		I	X																										
B.RS1		I	X																										
B.RS2		I	X																										
B.STT	X	I				X	X			X																		X	X
E.28F	X					X	X	I								X	X			X	X	X							
E.28O	X							I																					
E.35I							X		I									X										X	X
E.35O	X					X			I																				
E:35S	X								I																				
E.3IC							X		I																				
E:ABR	X					I																							
E:ANF	I	X				X																							
E:ANL	X				I																								
E:BAD																X				X	X	X	I			X			
E:BDC																X							I						
E.BDF																X				X	X	X	I			X			
E:BSG																X					X		I			X			
E:BSK		I																											
E:COT													X	X		X									I				
E:DIF											X		X	X		X									I				
E:FAM																X					I								

NOTE: I denotes internal reference, X denotes external reference.

	E$INT	E$SKD	E$TSI	E$CLK	E$UIN	E$SUB	E$OMI	E$T28	E$T35	E$MAG	U$RTA	U$LSQ	U$TGR	U$WFA	U$DAT	U$REP	U$RED	U$PST	M$ESC	M$LEV	M$STD	E$LOG	E$BDC	E$FRT	E$DIF	E$FMF	E$SRT	F$FMT	F$DMP
E:FCT						X					X					X								I					
E:FMF											X					X					X					I			
E:FRT	X					X	X							X		X	X			X	X	X		I					
E:I28	X							I																					
E:I35	X								I																				
E.IOF	X		X			X	X		I	X	X			X				X											
E:LOG		X		X							X						X	X	X			I							
E:MAG		X								I																			
E:MGS			X							I																			
E:MIN	X			I																									
E:MIT	X				I						X							X											
E:MTI	X									I																			
E:O28	X					X	X	I								X	X			X	X	X							
E:O35	X		X			X	X		I	X	X			X				X											
E:OMI		X					I																						
E:PAR	X					I																							
E:PWD	X					I																							
E:SEC	X			I																									
E.SF1	X				I																								
E:SKD	X	I	X			X	X	X	X	X				X		X	X	X	X	X	X							X	X
E:SRT											X																I		
E.TØ1		I			X																								
E.TØ2		I		X																									

	E$INT	E$SKD	E$TSI	E$CLK	E$UIN	E$SUB	E$OMI	E$T28	E$T35	E$MAG	U$RTA	U$LSQ	U$TGR	U$WFA	U$DAT	U$REP	U$RED	U$PST	M$ESC	M$LEV	M$STD	E$LOG	E$BDC	E$FRT	E$DIF	E$FMF	E$SRT	F$FMT	F$DMP
E.TØ3		I			X																								
E.TØ4		I		X			X																						
E.TØ5		I						X																					
E.TØ6		I							X																				
E.TØ7		I						X																					
E.TØ8	X	I		X			X																						
E.TØ9		I																											
E.T1Ø		I				X																							
E.T11		I								X																			
E.T12		I							X																				
E.T13		I					X																						
E.T14		I		X																									
E.T15		I	X				X		X	X																			
E:T28		X						I																					
E:T35		X							I																				
E.TM1						X					X					X								I					
E.TM2						X					X					X								I					
E.TM3				I																X									
E.TSF	X	I	X																										
E:TSI	X		I																										
E.TSK		I																											
E.UBF					I																								
E.UBU	X				I																								

	E$INT	E$SKD	E$TSI	E$CLK	E$UIN	E$SUB	E$OMI	E$T28	E$T35	E$MAG	U$RTA	U$LSQ	U$TGR	U$WFA	U$DAT	U$REP	U$RED	U$PST	M$ESC	M$LEV	M$STD	E$LOG	E$BDC	E$FRT	E$DIF	E$FMF	E$SRT	F$FMT	F$DMP
E:UIN		X			I																								
F:ANL	I	X																											
F:BBT																													X
F:CHK																												I	X
F:CVT																												I	X
F.DBF																												I	X
F:DDD																												X	I
F:DMP		X																											I
F:FMT		X																										I	
F:FST																													I
F.MTP	X									X																		I	X
F:TIM																													I
F:TRD																												I	
F:USE																												I	X
M:ESC		X																	I										
M.GNT				I																X									
M:INT	X																		I										
M:LEV		X																		I									
M.STA											X					X	X		I		X								
M:STD		X																			I								
M.TM1				X															I										
M.TRT				I																X									
M.UPT				I																X									

	E$INT	E$SKD	E$TSI	E$CLK	E$UIN	E$SUB	E$OMI	E$T28	E$T35	E$MAG	U$RTA	U$LSQ	U$TGR	U$WFA	U$DAT	U$REP	U$RED	U$PST	M$ESC	M$LEV	M$STD	E$LOG	E$BDC	E$FRT	E$DIF	E$FMF	E$SRT	F$FMT	F$DMP
U.AMP											X		X	X	I	X					X								
U.AST	X										X		X	X	I		X												
U.BGF														X	I														
U.BLL	X				X						X				I	X		X			X	X							
U.CCL														I		X													
U.CCN	X										X				I				X										
U.CDM													X	I															
U.CDT													X	I															
U.CLS													X	X	I	X			X										
U.CMP											X				I														
U:CNI											I							X											
U.CPC	X										X		X		I														
U.CPP											X		X		I														
U.CST	X										X	X	X	X	I		X		X		X								
U.CTM											X			X	I	X													
U.CYC					X						X				I														
U.DIU	X										X		X	X	I	X	X				X								
U.DTM													X	X	I	X													
U.END													X	X	I	X			X										
U.FAC	X										X		X	X	I														
U.FRQ														X		X	X				X	I							
U.GAN	X			X	X						X				I	X		X			X	X							
U:GET													I	X															

	E$INT	E$SKD	E$TSI	E$CLK	E$UIN	E$SUB	E$OMI	E$T28	E$T35	E$MAG	U$RTA	U$LSQ	U$TGR	U$WFA	U$DAT	U$REP	U$RED	U$PST	M$ESC	M$LEV	M$STD	E$LOG	E$BDC	E$FRT	E$DIF	E$FMF	E$SRT	F$FMT	F$DMP
U.IHB	X				X						X				I		X		X		X								
U.LFZ													X	I		X													
U.LSP											X	X			I														
U:LSQ											X	I																	
U.LST											X	X			I														
U.LTF											X		X	X	I														
U.LTM													X	I		X													
U.OAM													X		I	X													
U.ODI													X	X	I	X													
U.ODR														X	I	X													
U.OFZ													X	X	I	X													
U.OSG													X		I	X													
U.OTB													X		I	X													
U.OTM	X												X	X	I	X			X						X				
U:PST		X																I											
U:RED		X															I												
U:RP1														X		I													
U:RP2													X	X		I													
U:RP3		X														I													
U:RTA		X									I																		
U.RTY	X										X				I				X										
U.SIG											I		X								X								
U.SLP	X											X		X	I														

	E$INT	E$SKD	E$TSI	E$CLK	E$UIN	E$SUB	E$OMI	E$T28	E$T35	E$MAG	U$RTA	U$LSQ	U$TGR	U$WFA	U$DAT	U$REP	U$RED	U$PST	M$ESC	M$LEV	M$STD	E$LOG	E$BDC	E$FRT	E$DIF	E$FMF	E$SRT	F$FMT	F$DMP
U:TGR												X	I																
U.TM1	X			I																									
U.TM3	X										I																		
U.TM4	X										I																		
U.TRF	X										X		I	X					X										
U.TRK	X			X	X						X			X	I	X	X	X			X	X							
U.TRL													I	X					X										
U.UDR																I													
U:WFA													X	I															
U.WRK					X						X				I														
W.LAM														X	I	X													
W.LPK														X	I	X													
W.LTM														X	I	X													
W.ONR														X	I	X													
W.OST														X	I	X													
W.PAM														X	I	X													
W.PFZ														X	I	X													
W.PTM														X	I	X													
W.RAM														X	I	X													
W.RFZ														X	I	X													
W.RTM														X	I	X													
W.VAM														X	I	X													
W.VPK														X	I	X													

	W. VTM
E$INT	
E$SKD	
E$TSI	
E$CLK	
E$UIN	
E$SUB	
E$OMI	
E$T28	
E$T35	
E$MAG	
U$RTA	
U$LSQ	
U$TGR	
U$WFA	X
U$DAT	X
U$REP	X
U$RED	
U$PST	
M$ESC	
M$LEV	
M$STD	
E$LOG	
E$BDC	
E$FRT	
E$DIF	
E$FMF	
E$SRT	
F$FMT	
F$DMP	

APPENDIX II

NUSTAD MEMORY MAP

```
XXAP
P  E$INT    0000
   F:ANL    0169
   E:ANF    0100
P  E$SKD    01A3
   E.T15    01BF
   E.T14    01C0
   E.T13    01C1
   E.T12    01C2
   E.T11    01C3
   E.T10    01C4
   E.T09    01C5
   E.T08    01C6
   E.T07    01C7
   E.T06    01C8
   E.T05    01C9
   E.T04    01CA
   E.T03    01CB
   E.T02    01CC
   E.T01    01CD
   B.STT    01EA
   B.RS2    01F3
   B.RS1    01EC
   E.TSK    01BE
   E.TSF    01EB
   E:BSK    01CF
   E:SKD    01A3
   B.RET    01F9
P  E$SUB    01FA
   E:PWD    01FA
   B:ORT    025D
   E:ABR    025A
   E:PAR    0224
P  E$CLK    02A4
   M.TRI    032F
   M.UPT    042B
   U.TM1    0448
   M.GNT    03BB
   E.TM3    0449
   E:MIN    02D2
   E:SEC    02A4
P  E$TSI    0468
   E:TSI    0468
   B:IOR    047C
P  U$RED    049F
   U:RED    049F
P  U$RTA    0569
   U:RTA    0569
```

```
  U.TM4    093A
  U.TM3    0939
  U:CNI    07F5
  U.SIG    08D2
P U$LSQ    094B
  U:LSQ    094B
P '$TGR    09BE
  U.TRL    0CD3
  U.TRF    0B05
  U:TGR    09BE
  U:GET    0AA9
P U$WFA    0D00
  U.LTM    1037
  U.LFZ    1029
  U:WFA    0D00
  U.CDT    1053
  U.CDM    1061
  U.CCL    10B8
P E$JMI    10DE
  E:JMI    10DE
P U$REP    1246
  U:RP3    1397
  U:RP2    133F
  U:RP1    1246
  U.UDR    1865
P E$LJG    1AC1
  U.FRQ    1B91
  E:LJG    1AC1
P E$UIN    1BAD
  E:ANL    1C2D
  E:UIN    1BAD
  E:MIT    1C30
  E.SF1    1E2C
  E.UBU    1C48
  E.UBF    1C72
P M$ESC    1E2D
  M.STA    1EDB
  M:ESC    1E36
  M.TM1    1EDA
  M:INT    1E2D
P M$STD    1EF7
  M:STD    1EF7
  E:FAM    1FF4
P M$LEV    209A
  M:LEV    209A
P U$PST    21D0
  U:PST    21D0
P E$FRT    22E1
  E:FRT    22E5
  E.TM2    2329
  E.TM1    2328
  E:FCT    22E1
P E$BDC    232A
```

```
  E.BSG    2358
  E.BDF    2359
  E:BDC    232A
  E:BAD    232D
P E$FMF    235E
  E:FMF    235E
P E$DIF    23A1
  E:CDT    23A1
  E:DIF    23A7
P E$SRT    23FB
  E:SRT    23FB
P E$MAG    243A
  E:MTI    243A
  E:MGS    246F
  E:MAG    243D
P E$T35    24FC
  E.35Ø    261E
  E.35I    262F
  E:35S    26ØB
  E:T35    24FF
  E:D35    25C4
  E:I35    24FC
  E.IDF    2792
  E.3IC    267F
P E$T28    2793
  E.28Ø    3073
  E.28F    3077
  E:T28    2796
  E:D28    27C3
  E:I28    2793
P U$DAT    3088Ø
  U.CYC    35Ø7
  W.VTM    3691
  W.RTM    36C9
  W.PTM    36Ø5
  W.LTM    3659
  W.DST    362F
  U.RTY    3531
  U.DTM    3577
  U.LTF    3Ø88
  U.DTM    3593
  U.CTM    3345
  U.DTB    3595
  W.VPK    3683
  W.LPK    364B
  U.LST    3ØC8
  U.LSP    3154
  U.CST    353F
  U.DSG    35E9
  U.AST    354D
  U.WRK    3163
  U.TRK    3088Ø
  W.DNR    363D
  U.CPP    34EB
```

```
  U.CPC    34F9
  U.END    3569
  U.CMP    3347
  U.AMP    36F3
  U.SLP    3155
  U.CLS    355B
  U.BLL    309C
  W.RFZ    36BB
  W.PFZ    35F7
  U.DIU    30AA
  U.IHB    3523
  U.BGF    30B9
  U.JFZ    35BF
  W.VAM    36AD
  W.RAM    36E5
  W.PAM    3621
  W.LAM    3675
  U.JDR    35CD
  U.JDI    35DB
  U.CCN    3515
  U.JAM    35B1
  U.GAN    308E
  U.FAC    30BA
P F$FMT    3701
  F:CVT    378E
  F.MTP    381A
  F:USE    381B
  F:TRD    3811
  F:FMT    3701
  F:CHK    371D
  F.DBF    3842
P F$DMP    3865
  F:FST    3942
  F:DMP    3865
  F:TIM    3A1D
  F:DDD    3889
  F:BBT    3AD3
  *HIGH 3AFC
  *XFER 0100
  *BIAS 0000
```

APPENDIX III

PROGRAM USER'S MANUAL

SECTION I. OPERATING PROCEDURES.

I. 1 SYSTEM START-UP.

a. Turn on rack power in all three processor racks, Teletype machines, ADACS, receiver, etc.

b. Put the ASR 35 and the ASR 28 in the on line mode of operation.

c. Put the ADACS in the auto/normal mode.

d. Mount the SAL (MODCOMP Stand Alone Linking Loader, MODCOMP No. 600000-012) program paper tape in the PTR.

e. Turn on the power to the PTR, depress the sync button for approximately 2 seconds. Ensure that no part of the data has passed over the read head.

f. Set the data entry switch to a HEX A (Swt 12 and 14 set to a one).

g. Depress Master Clear.

h. Depress Fill.

i. HALT/RUN to RUN.

j. The SAL tape will now load. The ASR 35 will type out the following message:

SAL @ 787D, CSW = BIAS, Type "I" for commands

k. Set all data entry switches to zero.

l. Turn power off to the PTR, remove and rewind the SAL tape.

m. Mount "NUSTAD" part I tape, turn power on to the PTR and sync the tape as in e above.

n. Type the characters PR and carriage return on the ASR 35. This will cause the NUSTAD tape to begin loading into the processor. When the tape halts at the end, turn power off to the PTR, mount the NUSTAD part 2 tape, restore power and sync the PTR. Depress the carriage return key on the ASR 35 and the tape will continue to load. If the load was successful, the ASR 35 will type out "SATISFIED." If during the loading procedure any other message is typed out or if no message is typed at the end of NUSTAD part 2, attempt to reload the system. If it fails to load again begin maintenance on the processor.

o. Type "GO" and a carriage return on the ASR 35 and the system will begin operation. This will cause a "System Restart" (See Figure I. 1) to be typed on the ASR 28. This will be followed by a status display message on the ASR 28.

p. The system is now in automatic operation, refer to Section II for operator options.

q. If any of the receiver channels do not respond to the initial parameter values established by the program, the operator may use the "OPC" option as described in paragraph II. 4 to adjust the gain

and/or blanking levels for proper operation. The operator should ensure that there is sufficient signal strength to the receiver before adjusting gain to maximum.

I. 2 NORMAL OPERATION.

a. No operator intervention is required for normal operation. He may exercise the options described in Section II.

b. MANUAL UNATTENDED OPERATION: Prior to departing the station at the end of a duty day the operator will:

1. Set all receiver controls to the average settings as determined from the previous days Parameter History for the upcoming 16 hour period. See Section III. 1 for correlation between NUSTAD and EECO values.

2. If the processor should fail, the system will automatically return the receivers to the manual mode of operation.

I. 3 MAINTENANCE.

Prior to taking a channel down for maintenance the operator will place the Normal/Maintenance switch on the ADACS to the maintenance position. When maintenance is complete return the switch to the normal position.

```
.....................SYSTEM RESTART AT 023 215549.....................


023 215549  CURRENT RECEIVER STATUS, DET 215

 CHAN FREQ C I M AM GAIN TR BLL DIURNAL SIGMA AMPLITUDE
   A  17.8 1 1 0  A
   B  21.0 0 1 0  A
   C  21.0 0 1 0  A
   D  16.0 1 1 0  A
   E  22.3 0 1 0  A
   F  18.6 1 1 0  A
   G  24.0 4 1 0  A
   H ZERO INPUT...
   I  17.8 7 1 0  A
   J ZERO INPUT...
   K ZERO INPUT...
   L ZERO INPUT...
   M  24.0 7 1 0  A
   N  17.8 7 1 0  A


023 215554  A IR
023 215554  A CC05
023 215554  B IR
023 215554  B CC05
023 215554  C IR
023 215554  C CC01
023 215554  D IR
023 215554  D CC05
023 215554  E IR
023 215554  E CC01
023 215554  F IR
023 215554  F CC05
023 215554  G IR
023 215554  G CC05
023 215554  I IR
023 215554  M IR
023 215554  N IR
023 215620  D GC20
023 215642  H GC20
023 215708  A BC05
023 215713  B BC05
023 215718  C BC05
023 215723  D BC05
023 215729  E BC05
```

Figure I.1
SYSTEM LOG OF NORMAL INITIAL STARTUP

SECTION II. OPERATOR/NUSTAD COMMUNICATIONS.

II. 1 GENERAL.

Normally, NUSTAD waits for the operator to initialize an action request via the ASR 35 Teletype. This is referred to as NUSTAD being in the REQUEST MODE. When an action request message has been received, NUSTAD may require additional information from the operator. An inquiry message will be typed on the ASR 35 and NUSTAD will enter the RESPONSE MODE awaiting the information from the operator.

The operator may return to the REQUEST MODE at any time by depressing the CONSOLE INTERRUPT switch on the processor front panel. The following message is typed, and NUSTAD returns to the REQUEST MODE:

BACKGROUND TASK ABORTED BY OPERATOR

The list of action request options is limited, but allows the operator to enter messages into the station log, review DRFUD data tapes, and determine the system status on command.

II. 2 CALLING NUSTAD.

The operator may request the attention of NUSTAD by typing the / character. If NUSTAD is in the REQUEST MODE and ready to

process an action request, it will respond by crossing the / to form the letter X and spacing over. NUSTAD is now ready to interpret a keyword action request.

Example: Operator calls: /

NUSTAD responds: X

II. 3 OPERATOR ACTION REQUESTS.

Once the operator has NUSTAD's attention, he may enter an action request by typing a keyword from the following list:

Keyword	Resulting Action
DFC:	Execute DRFUD format checking program (See Section II. 8. 1 for programs operation).
DDD:	Execute DRFUD data display program (See Section II. 8. 2 for program operation).
STD:	Generate the CURRENT RECEIVER STATUS message on the ASR 28.
CRC:	Perform a CHANNEL REDUNDANCY CHECK.
OPC:	Perform an operator initiated parameter change (See Section II. 4 for format).
LOG:	Enter an operator generated message into the station log (See Section II. 5 for format).

II. 4 THE OPC OPTION.

The operator can request NUSTAD to make changes in parameter settings for individual sensor channels. NUSTAD will make the change

unless there is a signal in progress on the requested channel, in which case NUSTAD will inform the operator of the fact. If a change is made, the new value will be logged.

The format for the request is: X OPC:C, F, VV

WHERE: C is the channel for which the change is requested (A thru N).

F is the function indicating which parameter is to be changed.

Use: B for Blanking Level

G for RF Gain

T for Tracking Rate

V is a two digit value to which the requested function is to be set. Permissible ranges are:

Blanking Level	(ØØ thru 63)
RF Gain	(ØØ thru 24)
Tracking Rate	(ØØ thru 09)

NOTE: See Section III. 1 for correlation between the NUSTAD and EECO setting values.

II. 5 THE LOG OPTION.

The operator may enter information into the station log by using the LOG option. The text of the message he generates on the ASR 35 will be logged on the ASR 28.

The format used is: X LOG: (Message text)

The text of the message is terminated by depressing the return key.

II. 6 COMMUNICATION ERROR MESSAGES.

When NUSTAD interprets operator messages, it informs the operator of any errors it encounters. These are generally self-explanatory, but a further explanation is given below.

INVALID SYSTEM CALL - If NUSTAD is in the REQUEST MODE and the first character encountered is not a /, the message is ignored and an invalid system call message is typed.

INVALID KEYWORD, MSG IGNORED - If the first four characters after NUSTAD responds to the operator's call are not given in the keyword list above, the message is ignored and NUSTAD returns to the REQUEST MODE.

The following messages apply specifically to the OPC option:

INVALID CHANNEL - Channel designation was not an alphabetic character between A and N. Parameter change was not permitted.

INVALID FUNCTION - Function designation was not B, G, or T. Parameter change was not permitted.

VALUE NOT WITHIN LIMITS - The requested new value was not within the limits specified above for the function.

INVALID FORMAT - The message was not entered in the proper format. This message usually reflects a misplaced or missing comma in the message.

See Section II. 8 for interpretation of error messages associated with the DFC: and DDD: options.

II. 7 MESSAGE EDITING.

While the operator is preparing a message he may correct typing errors by using the following editing features:

RUB OUT - depressing the rub out will cause NUSTAD to ignore the last character typed. The first RUB OUT will delete the most previous character. Immediately typing a second will delete the character just prior to that, etc. When a RUB OUT attempts to delete a nonexistent character, i. e., one prior to the first character of the keyword, the entire

message is ignored and NUSTAD returns to the REQUEST MODE.

CANCEL - Simultaneously depressing the CONTROL and X keys will cause NUSTAD to ignore the entire message.

II. 8 BACKGROUND PROCESSING OF DRFUD DATA.

NUSTAD provides for tape format error detection and a data display of DRFUD data in a "useable" format. The error checking routine may be used separately or in conjunction with the display routine.

The use of bit position Ø, 1, and 2 of the switch register provide more versatility in using these programs. Prior to starting each format check or data display, the operator should decide which switch options he desires and set these switches accordingly.

II. 8. 1 DRFUD FORMAT CHECK OPTION (DFC:).

The operator initiates a format check by mounting a DRFUD tape on the tape drive and calling NUSTAD as described in Section II. 2 (calling NUSTAD). After NUSTAD acknowledges, the operator types:

DFC:

followed by a return character. The processor will respond with:

NO. OF BLOCKS TO BE CHECKED

This request is for the number of DRFUD scans the operator wishes to have checked; each scan should be equal to one second of DRFUD data. The maximum request for one check is limited by the computer word size to 32, 767 scans, which is just over 9 hours and 22 minutes of recorded DRFUD data. Checking more data than this will require that it be broken down into smaller segments.

NO. OF BLOCKS TO BE CHECKED	AMOUNT OF RECORDED DRFUD DATA CHECKED
1	1 Sec
6Ø	1 Min
3ØØ	5 Min
6ØØ	10 Min
36ØØ	1 Hour
32767	9 hrs 22 min 47 sec
(Max number of scans)	(Max data checked at one time)

TABLE II. 1

BLOCK COUNT TO TIME CONVERSION

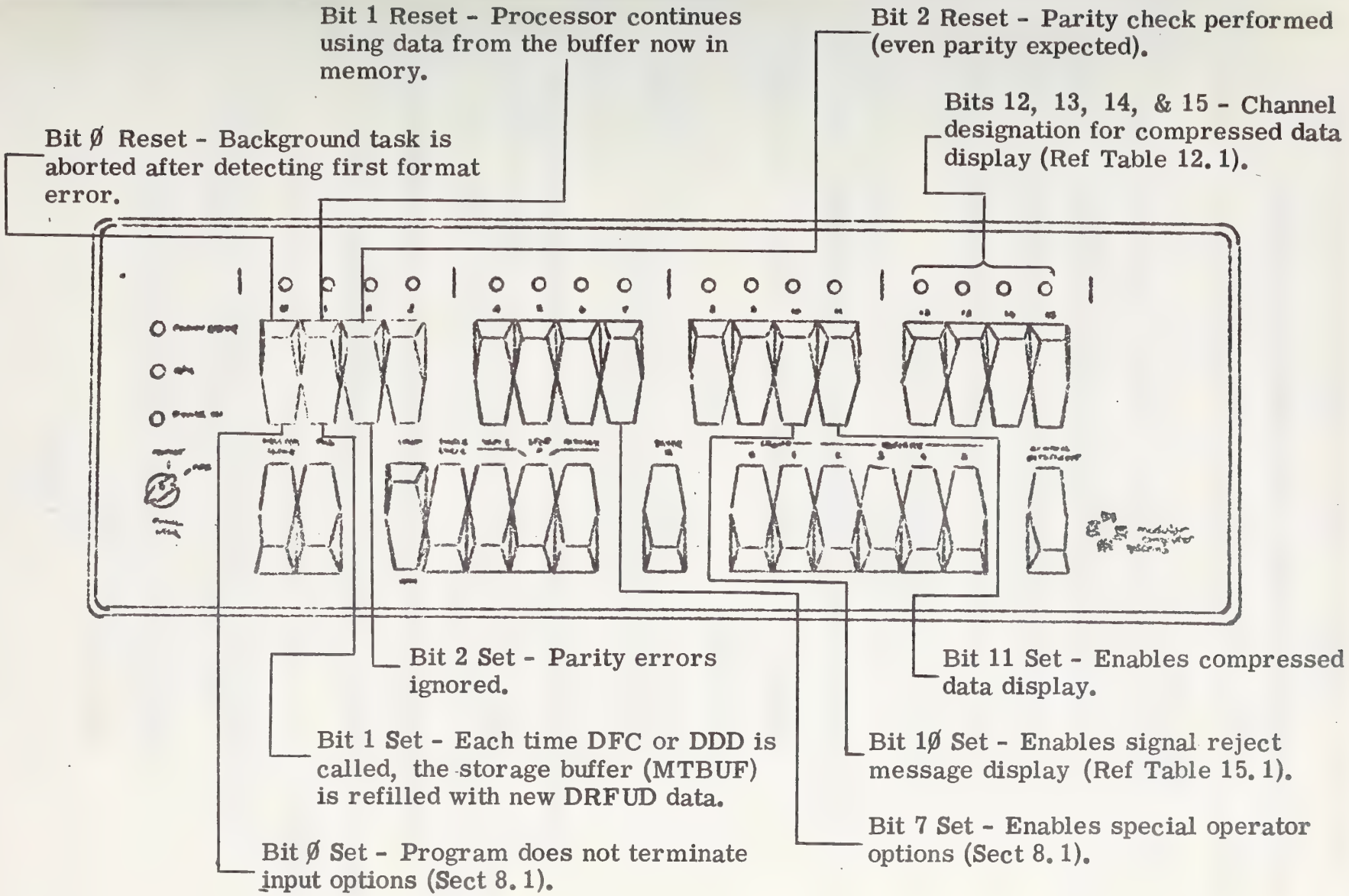
Bit 1 Reset - Processor continues using data from the buffer now in memory.
Bit 2 Reset - Parity check performed (even parity expected).
Bits 12, 13, 14, & 15 - Channel designation for compressed data display (Ref Table 12. 1).
Bit Ø Reset - Background task is aborted after detecting first format error.
Bit 2 Set - Parity errors ignored.
Bit 11 Set - Enables compressed data display.
Bit 1 Set - Each time DFC or DDD is called, the storage buffer (MTBUF) is refilled with new DRFUD data.
Bit 1Ø Set - Enables signal reject message display (Ref Table 15. 1).
Bit 7 Set - Enables special operator options (Sect 8. 1).
Bit Ø Set - Program does not terminate input options (Sect 8. 1).

FIGURE II. 1

After receiving the processor's request for the number of data blocks, the operator should type a positive integer no greater than 32767 followed by a return character. The processor then responds in one of three ways:

1. If the tape or tape unit is not ready, NUSTAD outputs a message indicating an improper tape drive condition. The operator should correct the improper condition and continue.

2. If the operator errs in his response, NUSTAD outputs: "INVALID CHARACTER, TASK ABORTED."

3. Reads and checks format on DRFUD tape.

Once the background task is aborted, the operator corrects the error by recalling NUSTAD and starting over.

Once the format checking process has begun, it will continue until a termination statement is output, which will be one of the following:

1. "TASK COMPLETED" indicates the requested amount of data has been checked and no errors were detected.

2. "FORMAT CHECK TERMINATED" indicates that an error was detected and Bit Ø of the switch register was reset.

The error message indicates which bit is in an improper state (See Figure II. 2) and displays the scan in which the error was detected. Once a termination message is output, NUSTAD returns to the REQUEST MODE.

II. 8. 2 DRFUD DATA DISPLAY OPTION (DDD:).

To call for a DRFUD DATA DISPLAY, the operator calls NUSTAD and enters

DDD:

followed by a return character. NUSTAD responds with:

SPECIFY ACTION DESIRED, 1, 2, OR 3

ACTION OPTION 1

OPTION 1 requires that the operator specify the data times at which the display is to begin and end. First NUSTAD requests:

SPECIFY START TIME DESIRED

The operator should respond with three digits of DOY, a space character, and six digits of TOD, followed by a return character.

NUSTAD will attempt to locate the requested start time on the DRFUD tape. Once the proper start time has been located, NUSTAD requests:

SPECIFY STOP TIME DESIRED

The operator should respond as above. NUSTAD begins displaying the DRFUD data at the data time requested and continues with one output record for each second of the requested time interval.

ACTION OPTION 2

OPTION 2 requires that the operator specify the data time at which the display is to begin and a number of data blocks (scans) that he wishes to have displayed.

The start time is requested and entered as above. NUSTAD then requests:

NO. OF BLOCKS TO BE DUMPED

The operator should respond with a positive integer less than 32767 followed by a return character. NUSTAD begins displaying the DRFUD data at the data time requested and continues until the requested number of scans has been displayed.

ACTION OPTION 3

OPTION 3 requires that the operator specify only the number of data blocks (scans) to be displayed. A start time is not required since

the display is started wherever the DRFUD tape is positioned. NUSTAD requests:

NO. OF BLOCKS TO BE DUMPED

Operator response should be as above. NUSTAD begins displaying DRFUD data and continues until the requested number of scans has been displayed.

If the DRFUD tape is positioned past a start time requested in OPTION 1 or 2, a message will be output stating this. The operator should rewind the tape and try again, ensuring that Bit 1 of the switch register is set. If the same message is output on the second try, the desired time is not contained on the DRFUD tape.

The display routine works in conjunction with the format check and if during the display process an error is detected, the Bit in error is noted and the scan containing the error is displayed. NUSTAD checks Bit Ø of the switch register to determine whether to abort the task or continue after each detected error.

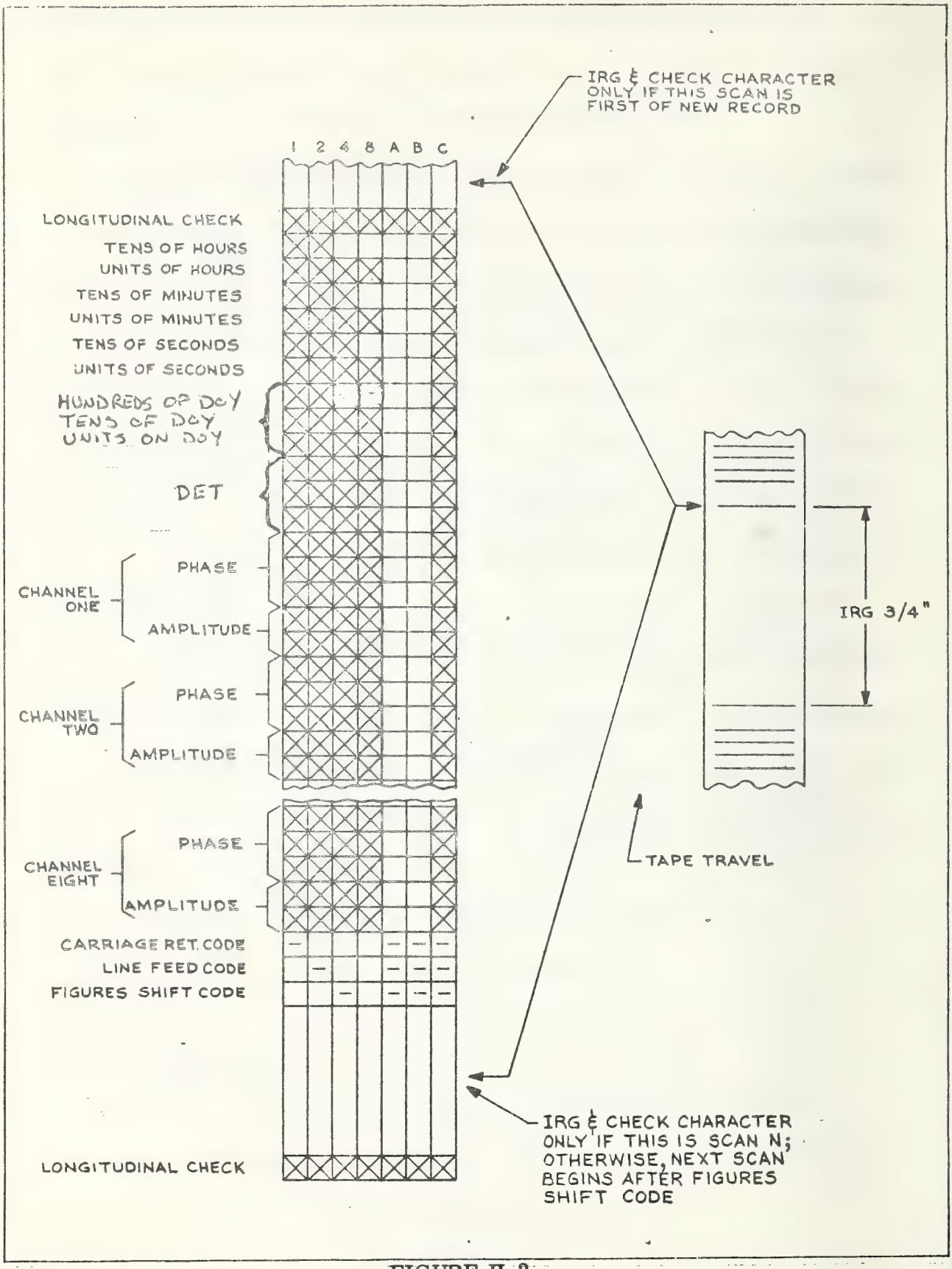

FIGURE II. 2

DRFUD TAPE FORMAT (NEW U SYSTEM)

```
X   DFC:                                  {OPERATOR CALLS FOR A DRFUD
                                           FORMAT CHECK.

NO. OF BLOCKS TO BE CHECKED?4096          {OPERATOR WANTS 4096 SCANS TO
                                           BE CHECKED.

FORMAT ERROR BIT 8                        {SOMEWHERE IN THE CHECKING
                                           PROCESS, THE ROUTINE DETECTED
                                           AN EOF CODE AS IS SHOWNIN
                                           THE DUMP AS A ??.
TOD ??0925  DOY 024    DET 215
73.5 42 58.8 33 73.4 31 00.1 04 28.1 39 00.2 39 53.2 40 00.1 05 313234

FORMAT CHECK TERMINATED                   {TERMINATION STATEMENT
                                           INDICATING THAT BIT 0
                                           OF THE SWITCH REG WAS SET.


X   DFC:

NO. OF BLOCKS TO BE CHECKED?700

TASK COMPLETED                            {TERMINATION STATEMENT INDICATES
                                           CHECK OF ALL 700 SCANS DETEC-
                                           NO ERRORS.  THERE IS NO DUMP
                                           INITIATED IF NO ERRORS ARE
                                           DETECTED.
```

FIGURE II. 3

EXAMPLE: DRFUD FORMAT CHECK.

TOD IS TIME OF DAY (HR MIN SEC)

DOY IS DAY OF YEAR

DET IS DETACHMENT NUMBER

TOD 000708 DOY 024 DET 215

73.7 40 59.1 33 72.4 31 00.1 04 27.2 36 00.2 39 52.4 39 00.1 05 313234

CH. 1 AMPLITUDE*

CH. 1 PHASE

CH. 2 AMPLITUDE*

CH. 2 PHASE

FIXED TRAILER CHARACTERS SHOULD ALWAYS BE 313234 IF A CHARACTER IS DROPPED SOMEWHERE IN THE SCAN, THESE CHARACTERS WILL SHIFT TO THE LEFT.

* ALL EIGHT CHANNELS OF AMPLITUDE AND PHASE ARE DUMPED.

FIGURE II. 4

EXAMPLE: DRFUD DATA DUMP FORMAT.

```
X  DDD:                                  DRFUD DATA DUMP CALL

SPECIFY ACTION DESIRED, 1, 2, OR 3. 1    {MACHINE RESPONSE & OPERATOR
                                         {DESIRE.

SPECIFY START TIME DESIRED. 024 000608   {INITIAL MACHINE RESPONSE ON
                                         {OPTION 1. TIME REQUESTED BY
                                         {OPERATOR.

SPECIFY STOP TIME DESIRED.024 000620     {SECONDARY MACHINE RESPONSE
                                         {ON OPTION 1. TIME REQUESTED BY
                                         {OPERATOR.


TOD 000608  DOY 024    DET 215
73.9 41 59.0 33 73.5 32 00.1 04 27.3 38 00.2 38 53.1 38 00.1 05 313234

TOD 000609  DOY 024    DET 215
73.8 40 59.1 33 73.0 32 00.1 04 27.1 38 00.2 38 53.1 38 00.1 05 313234

TOD 000610  DOY 024    DET 215
74.1 41 59.0 33 73.2 32 00.1 04 27.1 38 00.2 38 52.9 38 00.2 04 313234

TOD 000611  DOY 024    DET 215
74.0 41 59.1 33 73.3 32 00.1 04 27.2 38 00.2 38 52.6 38 00.1 04 313234

TOD 000612  DOY 024    DET 215
74.7 40 59.1 33 73.2 32 00.1 04 27.1 38 00.2 38 52.4 38 00.1 05 313234

TOD 000613  DOY 024    DET 215
74.6 41 59.1 33 73.2 32 00.1 04 27.3 38 00.1 38 52.4 38 00.1 05 313234

TOD 000614  DOY 024    DET 215
74.3 41 58.9 33 72.9 32 00.1 04 27.4 38 00.2 38 52.4 38 00.1 05 313234

TOD 000615  DOY 024    DET 215
74.0 41 59.1 33 73.4 32 00.1 04 27.2 38 00.2 38 52.4 38 00.1 04 313234

TOD 000616  DOY 024    DET 215
73.7 40 59.1 33 73.0 32 00.1 04 27.3 38 00.2 39 52.4 38 00.1 04 313234

TOD 000617  DOY 024    DET 215
73.7 40 58.8 33 72.4 32 00.1 04 27.3 38 00.2 39 52.4 38 00.1 05 313234

TOD 000618  DOY 024    DET 215
74.2 41 58.8 33 73.2 32 00.1 04 27.2 38 00.2 39 52.3 38 00.2 04 313234
```

EXAMPLE: DRFUD DATA DUMP OPTION 1.

FIGURE II. 5

```
X   DDD:

SPECIFY ACTION DESIRED, 1, 2, OR 3. 2

SPECIFY START TIME DESIRED. 024 000700

FUD TAPE POSITIONED PAST TIME DESIRED.        {MESSAGE INFORMING OPERATOR
                                              {THAT HE MUST REWIND TAPE
                                              {AND TRY AGAIN.

        OPERATOR REWINDS TAPE, AND CALLS FOR DDD: AGAIN.........

X   DDD:
                                              {
SPECIFY ACTION DESIRED, 1, 2, OR 3. 2         {OPERATOR SELECTS OPTION 2.
                                              {
SPECIFY START TIME DESIRED. 024 000700        {START TIME FURNISHED BY OPER.
                                              {
NO. OF BLOCKS TO BE DUMPED. 15                {OPERATOR ASKS FOR 15 SCANS
                                              {TO BE DUMPED.

TOD 000700  DOY 024     DET 215
73.6 40 60.3 33 74.2 31 00.1 04 27.3 38 00.2 39 52.7 39 00.1 05 313234

TOD 000701  DOY 024     DET 215
73.6 40 60.4 33 74.4 31 00.1 04 27.3 38 00.2 39 52.5 39 00.1 05 313234

TOD 000702  DOY 024     DET 215
74.0 41 60.4 33 74.4 31 00.2 04 27.4 39 00.2 39 52.3 39 00.1 05 313234

TOD 000702  DOY 024     DET 215
74.0 41 60.3 33 74.4 31 00.1 04 27.4 39 00.2 39 52.4 39 00.1 05 313234

TOD 000703  DOY 024     DET 215
74.0 41 60.3 33 74.5 31 00.1 04 27.4 39 00.2 39 52.6 39 00.1 05 313234

TOD 000704  DOY 024     DET 215
74.0 41 60.1 33 74.6 31 00.1 04 27.4 39 00.2 39 52.6 39 00.1 05 313234

TOD 000705  DOY 024     DET 215
73.7 40 60.0 33 74.1 31 00.1 04 27.3 38 00.2 39 52.4 39 00.1 05 313234
```

FIGURE II. 6

EXAMPLE: DRFUD DATA DUMP OPTION 2.

```
X  DDD:

SPECIFY ACTION DESIRED, 1, 2, OR 3. 3        {OPERATOR SELECTS OPTION 3.

NO. OF BLOCKS TO BE DUMPED. 10               {OPERATOR WANTS TO START
                                              WHEREVER THE DATA POINTER
                                              IS POSITIONED AND DUMP
                                              TEN SCANS.

TOD 000925  DOY 024    DET 215
73.5 42 58.8 33 73.4 31 00.1 04 28.1 39 00.2 39 53.2 40 00.1 05 313234

TOD 000926  DOY 024    DET 215
74.0 42 58.8 33 73.4 31 00.1 04 28.0 39 00.2 39 53.2 40 00.1 05 313234

TOD 000927  DOY 024    DET 215
74.0 43 58.7 33 73.4 31 00.2 04 28.1 39 00.2 39 53.4 40 00.1 05 313234

TOD 000928  DOY 024    DET 215
74.0 43 58.8 33 74.2 31 00.1 04 28.1 39 00.2 39 53.2 40 00.1 05 313234

TOD 000929  DOY 024    DET 215
74.0 43 59.2 33 74.9 31 00.1 04 28.0 39 00.1 39 53.0 40 00.1 05 313234

TOD 000930  DOY 024    DET 215
74.0 43 60.0 33 76.2 31 00.1 04 28.0 39 00.1 39 53.4 40 00.1 05 313234

TOD 000930  DOY 024    DET 215
73.8 42 60.5 33 76.3 31 00.1 04 28.1 39 00.1 39 53.0 40 00.1 05 313234

TOD 000931  DOY 024    DET 215
73.8 42 60.4 33 75.4 31 00.1 04 28.1 39 00.2 39 53.7 40 00.1 05 313234

TOD 000932  DOY 024    DET 215
74.1 42 60.1 33 74.8 31 00.1 04 28.1 39 00.1 39 53.4 40 00.1 05 313234

TOD 000933  DOY 024    DET 215
73.9 42 59.8 33 74.3 31 00.1 04 28.1 39 00.2 39 53.4 40 00.1 05 313234
```

FIGURE II. 7

EXAMPLE: DRFUD DATA DUMP OPTION 3.

```
X   DDD:

SPECIFY ACTION DESIRED, 1, 2, OR 3. 1

SPECIFY START TIME DESIRED. 300 000000

MAG TAPE PARITY ERROR,  CALLING TASK ABORTED.      {THIS CHECK CAN BE
                                                    BYPASSED BY SETTING
                                                    BIT 3 ON THE SWITCH
                                                    REGISTER.

X   DDD:

SPECIFY ACTION DESIRED, 1, 2, OR 3. 1

SPECIFY START TIME DESIRED. 025 000000

MAG TAPE NOT READY, CALLING TASK ABORTED.          {OPERATOR SHOULD PUT
                                                    MAG TAPE UNIT "ON LINE

X   DDD:

SPECIFY ACTION DESIRED, 1, 2, OR 3. 1

SPECIFY START TIME DESIRED. 025 000000

TAPE UNIT INOPERATIVE,  CALLING TASK ABORTED.      {OPERATOR SHOULD TURN O
                                                    ON POWER TO TAPE UNIT.
```

FIGURE II. 8

MAG TAPE CONDITION MESSAGES....

```
X   DDD:

SPECIFY ACTION DESIRED, 1, 2, OR 3. 2

SPECIFY START TIME DESIRED. 022 000700

FUD TAPE POSITIONED PAST DAY DESIRED.


X   DDD:

SPECIFY ACTION DESIRED, 1, 2, OR 3. 2

SPECIFY START TIME DESIRED. 024 000700

FUD TAPE POSITIONED PAST TIME DESIRED.
```

IN EACH OF THE CASES ABOVE, THE OPERATOR SHOULD REWIND THE DRFUD TAPE AND PERFORM THE SEARCH ONCE MORE. IF IT FAILS AGAIN, THE TIME DESIRED IS NOT CONTAINED ON THE DRFUD TAPE.*

```
X   DDD:

SPECIFY ACTION DESIRED, 1, 2, OR 3. 1

SPECIFY START TIME DESIRED. 024000700        {OPERATOR FAILED TO LEAVE
                                              {A SPACE BETWEEN DOY AND
INVALID FORMAT ON TIME REQUEST                {TIME.


X   DDD:

SPECIFY ACTION DESIRED, 1, 2, OR 3. 1

SPECIFY START TIME DESIRED. 024 00070X       {ILLEGAL CHARACTER USED
                                              {IN TIME REQUEST (X)
INVALID FORMAT ON TIME REQUEST
/
```

FIGURE II. 9

* SET SWITCH REGISTER BIT POSITION 1 BEFORE SEARCHING THE SECOND TIME.

SECTION III. LOG MESSAGE FORMATS.

The station log will be maintained on the ASR 28 Teletype. Messages entered into the log may be divided into four major categories:

(1) Routine; change of status, etc.

(2) Tables; current or historical data on system operating status.

(3) Reportable Signal Descriptors.

(4) Operator generated messages.

III. 1 ROUTINE MESSAGES.

Routine messages are generated by NUSTAD to log all changes in equipment status.

(1) Format: the general format is:

DDD TTTTTT C MM OOOOOOO

where: D represents a three digit DOY

T represents a six digit TOD for event

C indicates either a channel (A thru N) or T for the total system

M represents a two digit coded message

O represents additional information when necessary

(2) Coded messages: The following are the coded messages which may occur, and their meanings.

Two Char Code	Meaning of Code	Additional Information
AF	AIS Failure	NONE
AU	Auto/Manual Switch Set to Auto	NONE
BC	Blanking Level Changed	New Value
CC	Cardioid Configuration Changed	New Configuration Code
CF	Channel Put Coasting for Signal Failure	NONE
CN	Channel Put Coasting for Noise	NONE
CS	Channel Put Coasting for Saturation	NONE
D	Channel Put Down	NONE
FC	Frequency Changed	New Value
GC	RF Gain Changed	New Value
IR	INE Condition Reset	NONE
IS	INE Condition Set	NONE
MN	Auto/Manual Switch Set to Manual	NONE
MP	Memory Parity Error Discovered	Location of Error
MR	Maintenance Switch Reset	NONE
MS	Maintenance Swtich Set	NONE
PF	Processor Power Failure	NONE

Two Char Code	Meaning of Code	Additional Information
PR	Processor Power Restored	NONE
RS	Redundancy Check Successful	NONE
SD	System Dead in Scheduler	NONE
TC	Tracking Rate Changed	New Value
U	Channel Brought to Up State	Freq, Track Rate, Gain, Blank Level

(3) The various parameter values relate to the values on the EECO 881M as follows:

TRACKING RATE: Both the receiver and the processor work with ten discrete positions. The following table relates numeric values:

EECO	PROCESSOR
0.1	0
0.15	1
0.3	2
0.5	3
0.7	4
1.0	5
1.5	6
3.0	7
5.0	8
7.0	9

TABLE III. 1

TRACKING RATE EQUIVALENTS

RF GAIN: While the processor/ADACS uses 25 discrete values, the EECO control is by means of a continuously adjustable potentiometer. Conversion from one set of values to the other may be approximated with the following scale:

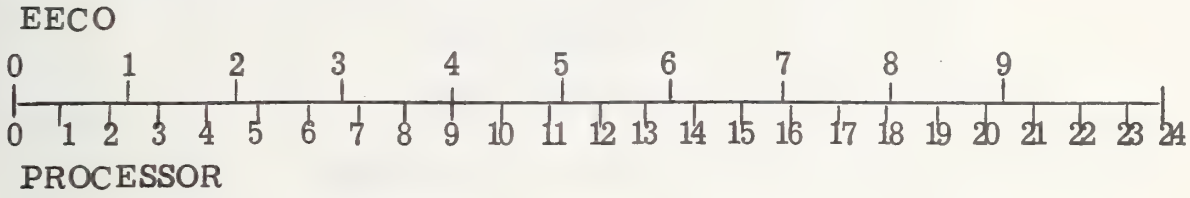

FIGURE III. 1
RF GAIN EQUIVALENTS

BLANKING LEVEL: The processor/ADACS uses 64 discrete values, the EECO control is by means of a continuously adjustable potentiometer. Conversion from one set of values to the other may be approximated with the following scale:

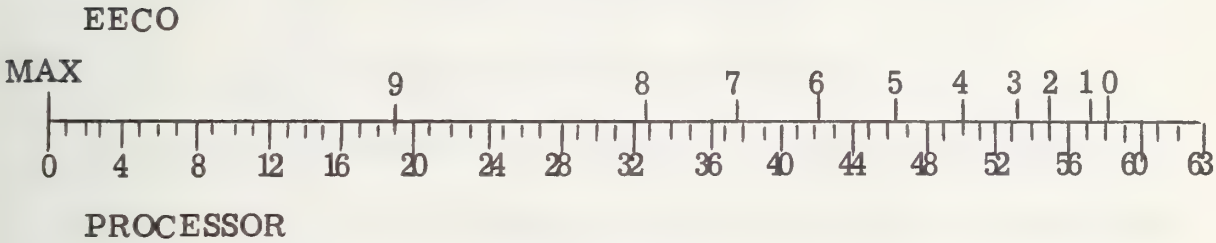

FIGURE III. 2
BLANKING LEVEL EQUIVALENTS

CARDIOID CONFIGURATION: The cardioid configuration is maintained as a one digit number which is interpreted as follows:

VALUE	CONFIGURATION
7	NO CARDIOID USED
6	WHIP REVERSE
5	LOOP REVERSE
4	LOOP/WIIP REVERSE
2	WHIP NORMAL
1	LOOP NORMAL
Ø	LOOP/WHIP NORMAL

TABLE III. 2
CARDIOID CONFIGURATION CODE INTERPRTATION

(4) SYSTEM RESTART: Whenever the system is reinitialized and restarted, the following message is logged:

.....SYSTEM RESTART AT DDD TTTTTT...

If the restart is processor initiated, the reason will be found as the last message prior to the restart message (PF, MP, etc.). If there is not a message indicating a processor discovered reason for restarting the system, the restart will be assumed to be operator initiated. The operator may induce a system restart by depressing the MASTER CLEAR switch on the processor control panel.

```
.....................SYSTEM RESTART AT 023 215549.....................


023 215549  CURRENT RECEIVER STATUS, DET 215

 CHAN FREQ C I M AM GAIN TR BLL DIURNAL SIGMA AMPLITUDE
   A  17.8 1 1 0  A
   B  21.0 0 1 0  A
   C  21.0 0 1 0  A
   D  16.0 1 1 0  A
   E  22.3 0 1 0  A
   F  18.6 1 1 0  A
   G  24.0 4 1 0  A
   H ZERO INPUT...
   I  17.8 7 1 0  A
   J ZERO INPUT...
   K ZERO INPUT...
   L ZERO INPUT...
   M  24.0 7 1 0  A
   N  17.8 7 1 0  A


023 215554  A IR
023 215554  A CC05
023 215554  B IR
023 215554  B CC05
023 215554  C IR
023 215554  C CC01
023 215554  D IR
023 215554  D CC05
023 215554  E IR
023 215554  E CC01
023 215554  F IR
023 215554  F CC05
023 215554  G IR
023 215554  G CC05
023 215554  I IR
023 215554  M IR
023 215554  N IR
023 215620  D GC20
023 215642  H GC20
023 215708  A BC05
023 215713  B BC05
023 215718  C BC05
023 215723  D BC05
023 215729  E BC05
023 215740  F BC05
```

FIGURE III. 3
Example of System Restart in Station Log

(5) REDUNDANCY FAILURE: If the periodic check between channels monitoring the same path should fail, the following message is generated:

DDD TTTTTT RED FAILURE, CHANS C AND C ON LEVEL N

where: C and C are the redundant channels and N is the reason for failure. N is interpreted as follows:

(LEVEL) N	REASON
1	The channel status, determined by the amplitude characteristics, is not the same for both channels.
2	The analysis status, indicating the progress into waveform processing, is not the same for both channels.
3	The short term noise characteristics are not the same on both channels.
4	The diurnal slope estimates are not approximately equal.

NOTE: If no two channels are monitoring the same path, no message is generated by the redundancy check program. All failures are logged. If no failures are found, a RS message is generated.

III. 2 TABLES.

The system generates several tables to provide data summarizing system performance and establishing current performance.

(1) CURRENT RECEIVER STATUS.

At present times, NUSTAD generates a table to record current parameter settings, processing values, and necessary status information. This status table may also be generated upon operator request by using the STD option.

Abbreviations used in the status table, in the order in which they appear:

CHAN	CHANNEL (A thru N)
FREQ	RECEIVER FREQUENCY (KHz)
C	CARDIOID CONFIGURATION (see above for interpretation)
I	INE STATUS Ø ⇒ Reset, 1 ⇒ Set
M	MAINTENANCE STATUS Ø ⇒ Reset, 1 ⇒ Set
AM	AUTO/MANUAL STATUS A ⇒ Auto, M ⇒ Manual
GAIN	RF GAIN (see above for interpretation)
TR	TRACKING RATE (see above for interpretation)
BLL	BLANKING LEVEL (see above for interpretation)
DIURNAL	DIURNAL SLOPE (see definition)
SIGMA	STANDARD DEVIATION (see definition)
AMPLITUDE	SIGNAL STRENGTH (-20 thru +20 dB)
NO INPUT	NO DIGITAL INPUT TO IOIS FOR THIS CHANNEL

LINE 1:

DDD TTTTTT CURRENT RECEIVER STATUS, DET NNN

where: D represents a three digit DOY

T represents a six digit TOD

N represents a three digit Det number

LINE 2: Column headings

LINE 3 thru 16: Channel status for each channel in tabular form. If INE or MAINTENANCE is set, no output is listed past the AM column; the channel is always down in these cases.

(2) PARAMETER HISTORY.

Thrice daily a table is generated to establish historical data useful in determining path reliability. The following information is logged for each channel:

1. The percentage of time that the system was operating during which the channel was in the UP state.

2. The percentage of up time that the channel was at each tracking rate.

3. The percentage of up taime that the channel was in each gain setting group.

024 060040 CURRENT RECEIVER STATUS, DET 215

CHAN	FREQ	C	I	M	AM	GAIN	TR	BLL	DIURNAL	SIGMA	AMPLITUDE	
A	17.8	5	0	0	A	09	8	00	-000.8	00.62	-09.80	UP
B	21.0	5	0	0	A	12	9	02	-000.1	00.62	-06.76	UP
C	21.0	1	0	0	A	12	9	04	-000.1	00.62	-03.16	UP
D	16.0	5	0	0	A	20	2	00	-000.1	00.25	-05.04	UP
E	22.3	1	0	0	A	09	2	01	&001.7	06.68	&00.68	UP
F	18.6	5	0	0	A	11	9	00	-000.1	00.00	-00.08	UP
G	24.0	5	0	0	A	20	3	00	-000.7	01.37	-01.24	UP
H	ZERO INPUT...											
I	17.8	7	0	0	A	11	8	00	-008.9	00.00	-19.96	DOWN
J	ZERO INPUT...											
K	ZERO INPUT...											
L	ZERO INPUT...											
M	24.0	7	0	0	A	19	9	00	&023.3	10.81	-06.48	C,R
N	17.8	7	0	0	A	24	6	00	-000.4	11.00	-18.80	C,R

024 090153 CURRENT RECEIVER STATUS, DET 215

CHAN	FREQ	C	I	M	AM	GAIN	TR	BLL	DIURNAL	SIGMA	AMPLITUDE	
A	17.8	5	0	0	A	12	9	00	-000.1	00.18	-03.04	UP
B	21.0	5	0	0	A	16	1	16	&000.6	03.00	-05.36	UP
C	21.0	1	0	0	A	14	1	17	&000.7	03.00	-06.96	UP
D	16.0	5	0	0	A	22	2	00	&000.0	00.81	-01.76	UP
E	22.3	1	0	0	A	11	1	01	&001.5	00.25	-00.68	UP
F	18.6	5	0	0	A	11	9	00	-000.2	00.06	&00.76	UP
G	24.0	5	0	0	A	18	9	00	-000.1	00.25	&04.52	UP
H	ZERO INPUT...											
I	17.8	7	1	1	M							
J	ZERO INPUT...											
K	ZERO INPUT...											
L	ZERO INPUT...											
M	24.0	7	0	0	A	20	9	00	-000.1	00.06	&03.48	UP
N	17.8	7	0	0	A	24	9	00	-000.1	11.93	-19.44	DOWN

FIGURE III. 4

Examples of Receiver Status Table

Gain settings are divided into eight groups. The values in each group are:

GROUP	SETTINGS INCLUDED
0	0, 1, 2
1	3, 4, 5
2	6, 7, 8
3	9, 10, 11
4	12, 13, 14
5	15, 16, 17
6	18, 19, 20
7	21, 22, 23, 24

TABLE III. 3

GAIN SETTING GROUPS

024 080040 PARAMETER HISTORY, DET 215

CHAN	A	B	C	D	E	F	G	H	I	J	K	L	M	N
UP	99	100	100	99	100	100	100	0	0	0	0	0	99	73
TRACK RATE														
0	0	0	0	12	7	0	1	0	0	0	0	0	0	0
1	0	0	0	9	8	0	1	0	0	0	0	0	0	0
2	0	0	0	19	41	0	1	0	0	0	0	0	0	0
3	0	0	0	16	25	0	1	0	0	0	0	0	0	0
4	0	0	0	6	18	0	0	0	0	0	0	0	0	0
5	0	0	0	8	1	0	1	0	0	0	0	0	0	0
6	0	0	0	6	0	0	0	0	0	0	0	0	1	0
7	0	0	0	14	0	2	1	0	0	0	0	0	1	1
8	4	0	0	11	0	5	3	0	0	0	0	0	0	4
9	95	100	100	0	0	93	91	0	0	0	0	0	98	95
GAIN														
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	56	0	0	0	58	98	0	0	0	0	0	0	0	0
4	44	100	100	0	30	2	49	0	0	0	0	0	0	0
5	0	0	0	0	12	0	24	0	0	0	0	0	73	0
6	0	0	0	88	0	0	27	0	0	0	0	0	27	0
7	0	0	0	12	0	0	0	0	0	0	0	0	0	100

FIGURE III. 5

Example of Parameter History Table

III. 3 REPORTABLE SIGNAL DESCRIPTORS.

When the waveform analysis programs have determined that a signal meets reporting criteria NUSTAD generates its report in three parts.

(1) PART I:

The first part of the report is generated as soon as NUSTAD considers a signal reportable. This message supplies the operator with a relatively detailed description of the waveform thru the current time and is primarily for the operator's information.

Abbreviations used in the Part I of the REPORTABLE SIGNAL DESCRIPTION, in the order in which they appear:

CHAN	CHANNEL (A thru N)
FREQ	RECEIVER FREQUENCY (KHz)
TR	TRACKING RATE
GN	RF GAIN
BL	BLANKING LEVEL
CARD	CARDIOID CONFIGURATION
SIGMA	STANDARD DEVIATION
AMP	AMPLITUDE
DIUR	DIURNAL SLOPE
ON	@ ONSET

PK	@ PEAK
1P	@ FIRST PEAK OF COCO SIGNAL
2P	@ VALLEY POINT OF COCO SIGNAL
HR	@ HALF RECOVERY (Minimum of 1Ø minutes past onset)
FR	@ SIGNAL TERMINATION

The following format is used:

LINE 1:

DDD TTTTTT REPORTABLE SIGNAL DESCRIPTION, DET NNN

where: D reflects a three digit DOY

T reflects a six digit TOD

N reflects a three digit Det number

LINE 2: A three digit serial signal identification number, used to associate the three parts of the message with the signal.

LINE 3:

CHAN C; FREQ FF.F LLL; TRN; GNNN;BLNN; CARD N

where: C represents the channel reporting the signal

F represents a three digit frequency of the channel

L represents a three character set of call letters associated with that frequency. UNK is used if they are unknown.

N represents the current values associated with the TRACKING RATE, RF GAIN, BLANKING LEVEL, and CARDIOID CONFIGURATION.

LINE 4:

SIGNAL TYPE: YYYYYY SIGMA: SS.SS

where: Y represents the signal type being reported (ALPHA, BRAVO, COCO, or DELTA)

S represents the standard deviation of the phase at onset.

LINE 5: Column headings

LINE 6: (data concerning onset)

ON DDD TTTTTT PPPPP.PP AAA.AA RRRR.R

where: D represents DOY of onset

T represents TOD of onset

P is the relative phase value at onset*

A is the signal amplitude at onset

R is the DIURNAL SLOPE at onset

(* NOTE: The Relative PHASE assumes a range from -4Ø96.ØØ microseconds through +4Ø95.93 microseconds).

LINE 6-a: (Data concerning first peak of COCO signal; not used with other types)

1P DDD TTTTTT PPPPP.PP AAA.AA

where: D represents DOY at first peak

T represents TOD at first peak

P is the relative phase value at first peak

A is the signal amplitude at first peak

LINE 6-b: (Data concerning "valley point" of COCO signal; not used with other types)

2P DDD TTTTTT PPPPP.PP AAA.AA

where: D represents DOY at valley point

T represents TOD at valley point

P is the relative phase value at valley point

A is the signal amplitude at valley point

LINE 7: (data concerning signal peak)

PK DDD TTTTTT PPPPP.PP AAA.AA

where: D represents DOY at signal peak

T represents TOD at signal peak

P is the relative phase value at signal peak

A is the signal amplitude at signal peak

LINE 8: (data at the point where a signal is considered valid, generally this is the point of Half Recovery).

HR DDD TTTTTT PPPPP.PP AAA.AA RRRR.R

where: D represents DOY at valid recovery

T represents TOD at valid recovery

P is the relative phase value at valid recovery

A is the signal amplitude at valid recovery

R is the current DIURNAL SLOPE and approximates the rate of recovery

LINE 9:

OFFSET: NNNN.NN

where: N is the phase offset, including compensation for the diurnal

LINE 10:

ONSET RATE: NNN.N

where: N is the average rate of change of the phase between onset and peak

```
024 213300  REPORTABLE SIGNAL DESCRIPTION, DET 215
002
CHAN B;FREQ 21.0 UNK;TR4;GN16:BL02;CARD5
SIGNAL TYPE: ALPHA    SIGMA 02.25
    DOY  TIME    PHASE     AMP      DIUR
ON  024 212231 &0033.37 -05.88    &000.0
PK  024 212254 &0018.37 -05.16
HR  024 213259 &0028.75 -05.60    &000.6
OFFSET: 0015.00
ONSET RATE:  039.1
```

```
025 104102  REPORTABLE SIGNAL DESCRIPTION, DET 215
013
CHAN C;FREQ 21.0 UNK;TR4;GN15:BL04;CARD1
SIGNAL TYPE: BRAVO    SIGMA 00.56
    DOY  TIME    PHASE     AMP      DIUR
ON  025 103052 &0070.31 -04.88    -000.2
PK  025 103120 &0091.43 -04.60
HR  025 104055 &0105.93 -04.88    &000.8
OFFSET: 0021.18
ONSET RATE:  045.4
```

```
024 223921  REPORTABLE SIGNAL DESCRIPTION, DET 215
005
CHAN B;FREQ 21.0 UNK;TR5;GN16:BL02;CARD5
SIGNAL TYPE: DELTA    SIGMA 00.50
    DOY  TIME    PHASE     AMP      DIUR
ON  024 222916 &0058.43 -05.08    -000.2
PK  024 223015 &0049.81 -05.32
HR  024 223921 &0058.56 -05.40    &000.3
OFFSET: 0008.50
ONSET RATE:  008.6
```

FIGURE III. 6

Examples of Part I of Reportable Signal Descriptions

(2) PART II:

The second part of the report is generated when NUSTAD has determined that the signal has terminated. Part II supplements the data generated in Part I to supply the operator with the remaining necessary information pertaining to the wave.

Abbreviations used are the same as described for Part I, above.

The following format is used:

LINES 1 thru 5 are the same as in Part I.

LINE 6: (data at signal termination)

FR DDD TTTTTT PPPPP.PP AAA.AA RRRR.R

where: D represents DOY of final recovery

T represents TOD of final recovery

P is the relative phase value at final recovery

A is the signal amplitude at final recovery

R is the DIURNAL SLOPE at final recovery

LINE 7:

SIGNAL TERMINATED: MMMMM

where: M takes on one of the following values:

VALUE	WHEN
NORMALLY	Recovery becomes full in phase and DIURNAL SLOPE
TIME LAPSE	Time since onset reaches 1 hour
SIGNAL LOST	Signal Amplitude drops out during recovery *
NEW ONSET	A new onset has been detected and the current signal analysis has been terminated to allow analysis of the new waveform

(*NOTE: A signal is also reported if the amplitude drops out after recovery has begun, but before half recovery.)

```
Ø24 214421  REPORTABLE SIGNAL DESCRIPTION, DET 215
ØØ2
CHAN B;FREQ 21.Ø UNK;TR4;GN16:BLØ2;CARD5
SIGNAL TYPE: ALPHA    SIGMA Ø2.25
    DOY  TIME    PHASE    AMP     DIUR
FR  Ø24 214359 &ØØ33.87 -Ø5.24  &ØØØ.2
SIGNAL TERMINATED: NORMALLY
```

```
Ø25 11Ø343  REPORTABLE SIGNAL DESCRIPTION, DET 215
Ø13
CHAN C;FREQ 21.Ø UNK;TR4;GN15:BLØ4;CARD1
SIGNAL TYPE: BRAVO    SIGMA ØØ.56
    DOY  TIME    PHASE    AMP     DIUR
FR  Ø25 11Ø339 &Ø116.ØØ -Ø4.36  &ØØØ.Ø
SIGNAL TERMINATED: NORMALLY
```

```
Ø24 224531  REPORTABLE SIGNAL DESCRIPTION, DET 215
ØØ5
CHAN B;FREQ 21.Ø UNK;TR5;GN16:BLØ2;CARD5
SIGNAL TYPE: DELTA    SIGMA ØØ.5Ø
    DOY  TIME    PHASE    AMP     DIUR
FR  Ø24 224518 &Ø058.12 -Ø4.48  &ØØØ.Ø
SIGNAL TERMINATED: NORMALLY
```

FIGURE III. 7

Examples of Part II of Reportable Signal Descriptions

(3) PART III:

The third part of the RSD message is generated as soon after Part II has been output as NUSTAD can find sufficient storage to ensure room for the verbage of this part. Part III is intended as part of the text of any message to be transmitted to HQ. Its format is such as to minimize possible data loss when transmitted over standard communication lines (i. e., numeric values are spelled out alphabetically; 2 being transmitted as TWO, etc.).

The following format is used:

LINE 1:

RSD (serial number)

where: the serial number is a three digit value used to identify the signal on this channel. It is initialized each time NUSTAD is reloaded and incremented for each new RSD message generated.

LINE 2:

(Class), (Type), (Frequency & Call Letters), (Path), (DOY)

where: class is either A or B to indicate whether class A or class B criteria have been met.

The type is either Alpha, Bravo, Coco, or Delta. The frequency is given digitally with the call letters for that transmitter. The path will be either FRONT or BACK.

LINES 3 & 4:

(Onset time), (Offset), (Direction)
(Onset Rate), (Onset Amplitude)

where: the onset time is given as six digits of hours, minutes, and seconds. The maximum phase offset is given in three digits to microseconds. The direction will be either ADVANCE or RETARD. The onset rate is the average rate-of-change in microseconds/minute. The amplitude is in dB from -20 to +20.

LINE 5: (paragraph B)

(Time from onset to peak), (Peak Amplitude)

The time from onset to peak is given as three digits representing tenths of minutes.

LINE 6: (paragraph C)

HALF (Time from onset to half recovery), (Half recovery amplitude)

Time is again in tenths of minutes, and the amplitude in dB.

LINE 7: (paragraph D)

FULL (Time from onset), (Amplitude at full recovery)
or
LOST (Phase offset remaining) MICROSECONDS, (Amplitude)
or
HOUR (Phase offset remaining) MICROSECONDS, (Amplitude)
or
(Phase offset remaining) MICROSECONDS, (Amplitude), SECOND ONSET

When the signal continues to full recovery, the first case above is used. The time from onset to full recovery is given in tenths of minutes and the amplitude in dB.

If the signal drops out before full recovery is reached, the remaining offset to recovery is given with the amplitude (Case 2 above).

If signal processing is terminated after one hour without full recovery, the third case is used to give the remaining offset and the signal amplitude.

If a possible new onset occurs prior to full recovery, the current signal is terminated using the fourth case to indicate the remaining offset to full recovery and the signal amplitude.

LINE 8: (paragraph E)

(Tracking Rate), (Sigma at Onset) MICROSECONDS, (Type)

where: the tracking rate is interpreted by the table in Section III. 1 above. The four digit onset Standard Deviation is given in hundreths of microseconds and the type is repeated from LINE 2.

LEADERS: To enable the operator to identify the Part III text on the punched paper tape, sections of unpunched tape (LEADERS) are run through the punch on the ASR 28. The format is:

LEADER	PART III OF RSD	LEADER

```
024 213300  REPORTABLE SIGNAL DESCRIPTION, DET 215
002
CHAN B;FREQ 21.0 UNK;TR4;GN16:BL02;CARD5
SIGNAL TYPE: ALPHA    SIGMA 02.25
    DOY  TIME    PHASE     AMP      DIUR
ON  024 212231 &0033.37 -05.88   &000.0
PK  024 212254 &0018.37 -05.16
HR  024 213259 &0028.75 -05.60   &000.6
OFFSET: 0015.00
ONSET RATE:  039.1
```

```
024 214421  REPORTABLE SIGNAL DESCRIPTION, DET 215
002
CHAN B;FREQ 21.0 UNK;TR4;GN16:BL02;CARD5
SIGNAL TYPE: ALPHA    SIGMA 02.25
    DOY  TIME    PHASE     AMP      DIUR
FR  024 214359 &0033.87 -05.24   &000.2
SIGNAL TERMINATED: NORMALLY
```

```
 RSD ZERO ZERO TWO
A, ALPHA,21.0 UNK, BACK, ZERO TWO FOUR
  A. TWO ONE TWO TWO THREE ONE, ZERO ONE FIVE, ADVANCE
     ZERO THREE NINE, MINUS ZERO SIX DB
  B. PEAK ZERO ZERO THREE, MINUS ZERO SIX DB
  C. HALF ONE ZERO FOUR, MINUS ZERO SIX DB
  D. FULL TWO ONE FOUR, MINUS ZERO SIX DB
  E. FOUR, ZERO TWO TWO FIVE MICROSECONDS, ALPHA
```

FIGURE III. 9

Parts I, II, and III of A Reportable Signal Description

(4) Understanding Real-Time RSD Messages.

1. When NUSTAD generates an RSD message, the parameters and values reported in the three parts supply information useful in determining the cause of the signal.

2. LONG TERM NOISE: If the diurnal estimate at onset (RSD, Part I, Last element in line beginning ON) is greater than about 2 to 3 microseconds/minute, the signal is probably the result of long term noise.

3. SHORT TERM NOISE: If the value of SIGMA at onset (RSD, Parts I, II, and III) is large, especially at the lower tracking rates, the signal is probably nothing more than short term noise with characteristics meeting criteria.

4. KEYING: If any of the reported amplitude points are abnormally low, or if the channel goes coasting during the signal, or if the onset is near the transmitter's normal keying period, the signal is probably the result of phase variations due to the transmitter's keying cycle. The channel's integrater balance should be checked for this type of signal report. (NOTE: Anytime an "U" message is generated, the channel is coming out of a coasting or down state.

If the coasting is less than 30 seconds, a "C" message will not have been printed.)

5. OVER RECOVERY: If the phase recovery value is significantly greater than the onset value for ALPHA or DELTA signals, or significantly greater than one cycle above the onset value for BRAVO signals, the signal is probably the result of natural causes (long term noise, etc.).

IV. OPERATOR GENERATED MESSAGES.

NUSTAD permits the operator to enter messages in the station log via the LOG option described in Section II. 5. The message appears in the log with the following format:

DDD TTTTTT L: (Message text)

```
023 220149  G TC08
023 220149  I TC08
023 220149  M TC08
023 220149  N TC08
023 220302 L: NUSTAD GOING UNATTENDED.................JRE........
023 220319  A TC09
023 220319  B TC08
023 220319  E TC09
023 220319  F TC09
023 220319  G TC09
```

FIGURE III. 10

Example of Operator Message Among Routine Messages

APPENDIX IV

SYSTEM TERMS AND ABBREVIATIONS

SYSTEM TERMS AND ABBREVIATIONS.

ADACS	Automatic Data Analysis and Control System. The interface "box" between the sensor and the processor.
AIS	Analog Input Subsystem. The hardware subsystem of the MODCOMP III processor which controls input of the analog data from the sensor.
ASCII	American Standard Code for Information Interchange. A 7 bit character code for data transmission on the ASR 35 Teletype.
BAUDOT	A 5 bit character code used for data transmission on the ASR 28 Teletype.
BCD	Binary Coded Decimal. A data coding scheme which retains the integrity of the decimal numbering system by coding each decimal digit individually in binary.
CPU	The processor's Central Processing Unit, the program control and execution section of the computer.
CR	The RETURN character on the ASR 35 Teletype.

DFC	A MODCOMP assembler defined pseudo-op used to Define Constants.
DI	Data Interrupt. One of two types of interrupts generated by peripheral devices in data transmissions. Refer to MODCOMP III Reference Manual No. 310-103000-000; Chapter V.
DMP	Direct Memory Processor. A hardware Input/Output subsystem of the MODCOMP III processor which permits data transmission in blocks rather than by CPU control for each character.
DOY	The Julian designation for the Day of Year.
DRFUD	The Digital Recorder For U Data. The subsystem which collects raw sensor data.
INE	Invalid data, Equipment sensed. A condition detected by hardware circuitry in the sensor and ADACS which alerts NUSTAD not to process data on that sensor channel.

IOIS	The Input/Output Interface Subsystem. The hardware subsystem of the MODCOMP III processor which controls digital Input/Output between the sensor/ADACS and the processor, and includes a set of eight user defined external interrupts.
NULL	A nonprinting character.
NUSTAD	New U System of Totally Automated Design. The complete software package of the automated U technique.
ROS	The Real-Time Operating System section of NUSTAD.
RSD	The Reportable Signal Description message generated by NUSTAD in three parts when a signal meeting reporting criteria is encountered.
SAL	The Stand Alone Linking Loader (MODCOMP No. 600000-012). The program used to load NUSTAD into memory.
SI	Service Interrupt. One of two types of interrupts generated by peripheral devices in data transmissions. Refer to MODCOMP III Reference Manual No. 310-103000-000; Chapter V.

TOD The Time of Day.

WTC The World Time Clock. The timing subsystem which supplies NUSTAD with the BCD time and timing interrupts.

APPENDIX V

MODCOMP III INSTRUCTION SET

MNEMONIC		OP.CODE	DESCRIPTION
LOAD, STORE, AND TRANSFER INSTRUCTIONS			
LDM*,r,x	A	E5	Load Register from Memory
LDI,r	V	ED	Load Register from Memory Immediate
LDS,r,d		F5	Load Reg. from Memory Short Displaced
LDX,r,x		FD	Load Reg. from Memory Short Indexed
STM*,r,x	A	E6	Store Register in Memory
STI,r	V	EE	Store Register in Memory Immediate
STS,r,d		F6	Store Reg. in Memory Short Displaced
STX,r,x		FE	Store Reg. in Memory Short Indexed
LBX,r,x		AE	Load Byte from Memory
SBX,r,x		AF	Store Syte in Memory
LFM*,r,x	A	A4	Load File from Memory
LFS,r,d		B4	Load File from Memory Short Displaced
LFX,r,x		BC	Load File from Memory Short Indexed
SFM*,r,x	A	A5	Store File in Memory
SFS,r,d		B5	Store File in Memory Short Displaced
SFX,r,x		BD	Store File in Memory Short Indexed
TRR,r,s		6D	Transfer Register to Register
TRRB,r,s	B	7D	Transfer Reg. to Reg. and Branch if Nonzero
GMR,r,b		67	Generate Mask in Register
GMRB,r,b	B	77	Generate Mask in Reg. and Branch Unconditionally

MNEMONIC		OP.CODE	DESCRIPTION
ARITHMETIC INSTRUCTIONS			
ADM*,r,x	A	E0	Add Memory to Register
ADI,r	V	E8	Add Memory to Register Immediate
ADS,r,d		F0	Add Memory to Register Short Displaced
ADX,r,x		F8	Add Memory to Register Short Indexed
ADMM*,r,x	A	C0	Add Register to Memory
ADMB*,r,x	A,B	C4	Add Reg. to Memory and Branch if Nonzero
ADSM,r,d		D0	Add Register to Memory Short Displaced
ADSB,r,d	B	D4	Add Reg. to Mem. Short Disp. and Branch if Nonzero
ADXM,r,x		D8	Add Register to Memory Short Indexed
ADXB,r,x	B	DC	Add Reg. to Mem. Short Indx. and Branch if Nonzero
ADR,r,s		68	Add Register to Register
ADRB,r,s	B	78	Add Reg. to Reg. and Branch if Nonzero
DAR,r,s		22	Double Precision Add Register to Register
SUM*,r,x	A	E1	Subtract Memory from Register
SUI,r	V	E9	Subtract Memory from Register Immediate
SUS,r,d		F1	Subtract Memory from Register Short Displaced
SUX,r,x		F9	Subtract Memory from Register Short Indexed
SUR,r,s		69	Subtract Register from Register
SURB,r,s	B	79	Subtract Reg. from Reg. and Branch if Nonzero
MPM*,r,x	A	A0	Multiply Memory by Register
MPS,r,d		B0	Multiply Memory by Register Short Displaced
MPX,r,x		B8	Multiply Memory by Register Short Indexed
MPR,r,s		20	Multiply Register by Register
DVM*,r,x	A	A1	Divide Register by Memory
DVS,r,d		B1	Divide Register by Memory Short Displaced
DVX,r,x		B9	Divide Register by Memory Short Indexed
DVR,r,s		21	Divide Register by Register
CRMB*,r,x	A,B,B	C7	Compare Memory and Register
CRSB,r,d	B,B	D7	Compare Memory and Register Short Displaced
CRXB,r,x	B,B	DF	Compare Memory and Register Short Indexed
TRO,r		0E	Transfer and Reset Overflow Status
TTR,r,s		6F	Transfer 2's Complement Register to Register
TTRB,r,s	B	7F	Trans. 2's Complement Reg. to Reg. and Branch if Nonzero

MNEMONIC		OP.CODE	DESCRIPTION
LOGICAL INSTRUCTIONS			
ETM*,r,x	A	E2	Extract Memory from Register
ETI,r	V	EA	Extract Memory from Register Immediate
ETS,r,d		F2	Extract Memory from Register Short Displaced
ETX,r,x		FA	Extract Memory from Register Short Indexed
ETMM*,r,x	A	C1	Extract Register from Memory
ETMB*,r,x	A,B	C5	Extract Reg. from Mem. and Branch if Nonzero
ETSM,r,d		D1	Extract Register from Memory Short Displaced
ETSB,r,d	B	D5	Ext. Reg. from Mem. Sht. Dis. & Br. if Nonzero
ETXM,r,x		D9	Extract Reg. from Memory Short Indexed
ETXB,r,x	B	DD	Ext. Reg. from Mem. Sht. Indx. & Br. if Nonzero
ETR,r,s		6A	Extract Register from Register
ETRB,r,s	B	7A	Ext. Reg. from Reg. and Branch if Nonzero
ORM*,r,x	A	E3	OR Memory and Register
ORI,r	V	EB	OR Memory and Register Immediate
ORS,r,d		F3	OR Memory and Register Short Displaced
ORX,r,x		FB	OR Memory and Register Short Indexed
ORMM*,r,x	A	C2	OR Register and Memory
ORSM,r,d		D2	OR Register and Memory Short Displaced
ORXM,r,x		DA	OR Register and Memory Short Indexed
ORR,r,s		6B	OR Register and Register
ORRB,r,s	B	7B	OR Register and Register and Branch if Nonzero
XOM*,r,x	A	E4	Exclusive OR Memory and Register
XOI,r	V	EC	Exclusive OR Memory and Register Immediate
XOS,r,d		F4	Exclusive OR Mem. and Reg. Short Displaced
XOX,r,x		FC	Exclusive OR Mem. and Reg. Short Indexed
XOR,r,s		6C	Exclusive OR Register and Register
ZRR,r		6C	Zero Register
XORB,r,s	B	7C	Exclusive OR Reg. and Reg. and Branch if Nonzero
TOR,r,s		OD	Trans. 1's Complement Register to Register
TRMB*,r,x	A,B	C6	Test Reg. and Mem. and Branch if any 1's Compare
TRSB,r,d	B	D6	Test Reg. and Mem. Sht. Disp. & Br. if any 1's Compare
TRXB,r,x	B	DE	Test Reg. and Mem. Sht. Indx. & Br. if any 1's Compare
TERB,r,s	B	7E	Test Reg. and Reg. and Br. if any 1's Compare

MNEMONIC		OP.CODE	DESCRIPTION

SHIFT INSTRUCTIONS

LAD,r,c		2E	Shift Left Arithmetic Double
RAD,r,c		2A	Shift Right Arithmetic Double
LAS,r,c		2F	Shift Left Arithmetic Single
RAS,r,c		2B	Shift Right Arithmetic Single
LLD,r,c		2C	Shift Left Logical Double
RLD,r,c		28	Shift Right Logical Double
LLS,r,c		2D	Shift Left Logical Single
RLS,r,c		29	Shift Right Logical Single
LRS,r,c		0F	Left Rotate Single

BIT MANIPULATION INSTRUCTIONS

LBR,r,b		65	Load Bit in Register
LBRB,r,b	B	75	Load Bit in Register and Branch Unconditionally
ABMM*,b,x	A	80	Add Bit in Memory
ABMB*,b,x	A,B	84	Add Bit in Memory and Branch in Nonzero
ABSM,b,d		90	Add Bit in Memory Short Displaced
ABSB,b,d	B	94	Add Bit in Mem. Short Disp. and Branch if Nonzero
ABXM,b,x		98	Add Bit in Memory Short Indexed
ABXB,b,x	B	9C	Add Bit in Mem. Short Indx. and Branch if Nonzero
ABR,r,b		60	Add Bit in Register
ABRB,r,b	B	70	Add Bit in Register and Branch if Nonzero
SBR,r,b		61	Subtract Bit in Register
SBRB,r,b	B	71	Subtract Bit in Register and Branch if Nonzero
ZBMM*,b,x	A	81	Zero Bit in Memory
ZBMB*,b,x	A,B	85	Zero Bit in Memory and Branch if Nonzero
ZBSM,b,d		91	Zero Bit in Memory Short Displaced
ZBSB,b,d	B	95	Zero Bit in Mem. Shrt Disp. and Branch if Nonzero
ZBXM,b,x		99	Zero Bit in Memory Short Indexed
ZBXB,b,x	B	9D	Zero Bit in Mem. Shrt Indx. and Branch if Nonzero
ZBR,r,b		62	Zero Bit in Register
ZBRB,r,b	B	72	Zero Bit in Register and Branch if Nonzero
OBMM*,b,x	A	82	OR Bit in Memory
OBSM,b,d		92	OR Bit in Memory Short Displaced
OBXM,b,x		9A	OR Bit in Memory Short Indexed
OBR,r,b		63	OR Bit in Register
OBRB,r,b	B	73	OR Bit in Register and Branch Unconditionally
XBR,r,b		64	Exclusive OR Bit in Register
XBRB,r,b	B	74	Excl. OR Bit in Register and Branch if Nonzero
TBMB*,b,x	A,B	86	Test Bit in Memory and Branch if One
TBSB,b,d	B	96	Test Bit in Mem. Shrt Disp. and Branch if One
TBXB,b,x	B	9E	Test Bit in Mem. Shrt Indx. and Branch if One
TBRB,r,b	B	76	Test Bit in Register and Branch if One
CBMB*,b,x	A,B,B	87	Compare Bit and Memory
CBSB, b,d	B	97	Compare Bit and Memory Short Displaced
CBXB,b,x	B	9F	Compare Bit and Memory Short Indexed

MNEMONIC		OP.CODE	DESCRIPTION
BYTE MANIPULATION INSTRUCTIONS			
MUR,r,s		0B	Move Upper Byte Register to Register
MLR,r,s		0C	Move Lower Byte Register to Register
MBR,r,s		08	Move Byte Right Register to Register
MBL,r,s		09	Move Byte Left Register to Register
IBR,r,s		0A	Interchange Bytes Register to Register
UNCONDITIONAL BRANCH INSTRUCTIONS			
BLM*,r,x	A	E7	Branch and Link
BLI,r		EF	Branch and Link Immediate
BRU*,x	A	E7	Branch Unconditionally
HOP,d		F7	Branch Short Displaced
BRX,x		FF	Branch Short Indexed
CONTROL INSTRUCTIONS			
HLT		00	Halt
NOP		66	No Operation
INTERRUPT AND CALL INSTRUCTIONS			
SIE,1		26-1	Set Interrupt Enable
RIE,1		27-1	Reset Interrupt Enable
SIR,1		26-2	Set Interrupt Request
RIR,1		27-2	Reset Interrupt Request
SIA,1		26-0	Set Interrupt Active
RIA,1		27-0	Reset Interrupt Active
REX,n		23	Request Executive Service
RMI		01	Request Multiprocessor Interrupt
CAR		24	Clear Active Interrupt and Return
CIR		25	Clear Interrupt and Return
INPUT/OUTPUT INSTRUCTIONS			
ISA,r,u		48	Input Status from I/O Group A
ISB,r,u		49	Input Status from I/O Group B
ISC,r,u		4A	Input Status from I/O Group C
ISD,r,u		4B	Input Status from I/O Group D
IDA,r,u		4C	Input Data From I/O Group A
IDB,r,u		4D	Input Data From I/O Group B
IDC,r,u		4E	Input Data From I/O Group C
IDD,r,u		4F	Input Data From I/O Group D
OCA,r,u		40	Output Command to I/O Group A
OCB,r,u		41	Output Command to I/O Group B

MNEMONIC	OP.CODE	DESCRIPTION

INPUT/OUTPUT INSTRUCTIONS - CONTINUED

OCC,r,u	42	Output Command to I/O Group C
OCD,r,u	43	Output Command to I/O Group D
ODA,r,u	44	Output Data to I/O Group A
ODB,r,u	45	Output Data to I/O Group B
ODC,r,u	46	Output Data to I/O Group C
ODD,r,u	47	Output Data to I/O Group D

MNEMONIC		OP.CODE	DESCRIPTION
A			
ABMB*,b,x	A,B	84	Add Bit in Memory and Branch if Nonzero
ABMM*,b,x	A	80	Add Bit in Memory
ABR,r,b		60	Add Bit in Register
ABRB,r,b	B	70	Add Bit in Register and Branch if Nonzero
ABSB,b,d	B	94	Add Bit in Mem. Short Disp. and Branch if Nonzero
ABSM,b,d		90	Add Bit in Memory Short Displaced
ABXB,b,x	B	9C	Add Bit in Mem. Short Indx. and Branch if Nonzero
ABXM,b,x		98	Add Bit in Memory Short Indexed
ADI,r	V	E8	Add Memory to Register Immediate
ADM*,r,x	A	E0	Add Memory to Register
ADMB*,r,x	A,B	C4	Add Reg. to Memory and Branch if Nonzero
ADMM*,r,x	A	C0	Add Register to Memory
ADR,r,s		68	Add Register to Register
ADRB,r,s	B	78	Add Reg. to Reg. and Branch if Nonzero
ADS,r,d		F0	Add Memory to Register Short Displaced
ADSB,r,d	B	D4	Add Reg. to Mem. Short Disp. and Branch if Nonzero
ADSM,r,d		D0	Add Register to Memory Short Displaced
ADX,r,x		F8	Add Memory to Register Short Indexed
ADXB,r,x	B	DC	Add Reg. to Mem. Short Indx. and Branch if Nonzero
ADXM,r,x		D8	Add Register to Memory Short Indexed
B			
BLI,r		EF	Branch and Link Immediate
BLM*,r,x	A	E7	Branch and Link
BRU*,x	A	E7	Branch Unconditionally
BRX,x		FF	Branch Short Indexed
C			
CAR		24	Clear Active Interrupt and Return
CBMB*,b,x	A,B,B	87	Compare Bit and Memory
CBSB,b,d	B	97	Compare Bit and Memory Short Displaced
CBXB,b,x	B	9F	Compare Bit and Memory Short Indexed
CIR		25	Clear Interrupt and Return
CRMB*,r,x	A,B,B	C7	Compare Memory and Register
CRSB,r,d	B,B	D7	Compare Memory and Register Short Displaced
CRXB,r,x	B,B	DF	Compare Memory and Register Short Indexed

MNEMONIC		OP.CODE	DESCRIPTION
D			
DAR,r,s		22	Double Precision Add Register to Register
DVM*,r,x	A	A1	Divide Register by Memory
DVR,r,s		21	Divide Register by Register
DVS,r,d		B1	Divide Register by Memory Short Displaced
DVX,r,x		B9	Divide Register by Memory Short Indexed
E			
ETI,r	V	EA	Extract Memory from Register Immediate
ETM*,r,x	A	E2	Extract Memory from Register
ETMB*,r,x	A,B	C5	Extract Reg. from Mem. and Branch if Nonzero
ETMM*,r,x	A	C1	Extract Register from Memory
ETR,r,s		6A	Extract Register from Register
ETRB,r,s	B	7A	Ext. Reg. from Reg. and Branch if Nonzero
ETS,r,d		F2	Extract Memory from Register Short Displaced
ETSB,r,d	B	D5	Ext. Reg. from Mem. Sht. Dis. & Br. if Nonzero
ETSM,r,d		D1	Extract Register from Memory Short Displaced
ETX,r,x		FA	Extract Memory from Register Short Indexed
ETXB,r,x	B	DD	Ext. Reg. from Mem. Sht, Indx. & Br. if Nonzero
ETXM,r,x		D9	Extract Reg. from Memory Short Indexed
G			
GMR,r,b		67	Generate Mask in Register
GMRB,r,b	B	77	Generate Mask in Register and Branch Unconditionally
H			
HLT		00	Halt
HOP,d		F7	Branch Short Displaced
I			
IBR,r,s		0A	Interchange Bytes Register to Register
IDA,r,u		4C	Input Data From I/O Group A
IDB,r,u		4D	Input Data From I/O Group B
IDC,r,u		4E	Input Data From I/O Group C
IDD,r,u		4F	Input Data From I/O Group D
ISA,r,u		48	Input Status from I/O Group A
ISB,r,u		49	Input Status from I/O Group B
ISC,r,u		4A	Input Status from I/O Group C
ISD,r,u		4B	Input Status from I/O Group D

MNEMONIC		OP.CODE	DESCRIPTION
L			
LAD,r,c		2E	Shift Left Arithmetic Double
LAS,r,c		2F	Shift Left Arithmetic Single
LBR,r,b		65	Load Bit in Register
LBRB,r,b	B	75	Load Bit in Register and Branch Unconditionally
LBX,r,x		AE	Load Byte from Memory
LDI,r	V	ED	Load Register from Memory Immediate
LDM*,r,x	A	E5	Load Register from Memory
LDS,r,d		F5	Load Register from Memory Short Displaced
LDX,r,x		FD	Load Register from Memory Short Indexed
LFM*,r,x	A	A4	Load File from Memory
LFS,r,d		B4	Load File from Memory Short Displaced
LFX,r,x		BC	Load File from Memory Short Indexed
LLD,r,c		2C	Shift Left Logical Double
LLS,r,c		2D	Shift Left Logical Single
LRS,r,c		OF	Left Rotate Single
M			
MBL,r,s		09	Move Byte Left Register to Register
MBR,r,s		08	Move Byte Right Register to Register
MLR,r,s		OC	Move Lower Byte Register to Register
MPM*,r,x	A	AO	Multiply Memory by Register
MPR,r,s		20	Multiply Register by Register
MPS,r,d		BO	Multiply Memory by Register Short Displaced
MPX,r,x		B8	Multiply Memory by Register Short Indexed
MUR,r,s		OB	Move Upper Byte Register to Register
N			
NOP		66	No Operation

MNEMONIC		OP.CODE	DESCRIPTION
O			
OBMM*,b,x	A	82	OR Bit in Memory
OBR,r,b		63	OR Bit in Register
OBRB,r,b	B	73	OR Bit in Register and Branch Unconditionally
OBSM,b,d		92	OR Bit in Memory Short Displaced
OBXM,b,x		9A	OR Bit in Memory Short Indexed
OCA,r,u		40	Output Command to I/O Group A
OCB,r,u		41	Output Command to I/O Group B
OCC,r,u		42	Output Command to I/O Group C
OCD,r,u		43	Output Command to I/O Group D
ODA,r,u		44	Output Data to I/O Group A
ODB,r,u		45	Output Data to I/O Group B
ODC,r,u		46	Output Data to I/O Group C
ODD,r,u		47	Output Data to I/O Group D
ORI,r	V	EB	OR Memory and Register Immediate
ORM*,r,x	A	E3	OR Memory and Register
ORMM*,r,x	A	C2	OR Register and Memory
ORR,r,s		6B	OR Register and Register
ORRB,r,s	B	7B	OR Register and Register and Branch if Nonzero
ORS,r,d		F3	OR Memory and Register Short Displaced
ORSM,r,d		D2	OR Register and Memory Short Displaced
ORX,r,x		FB	OR Memory and Register Short Indexed
ORXM,r,x		DA	OR Register and Memory Short Indexed
R			
RAD,r,c		2A	Shift Right Arithmetic Double
RAS,r,c		2B	Shift Right Arithmetic Single
REX,n		23	Request Executive Service
RIA,1		27-0	Reset Interrupt Active
RIE,1		27-1	Reset Interrupt Enable
RIR,1		27-2	Reset Interrupt Request
RLD,r,c		28	Shift Right Logical Double
RLS,r,c		29	Shift Right Logical Single
RMI		01	Request Multiprocessor Interrupt

MNEMONIC		OP.CODE	DESCRIPTION
S			
SBR,r,b		61	Subtract Bit in Register
SBRB,r,b	B	71	Subtract Bit in Register and Branch if Nonzero
SBX,r,x		AF	Store Byte in Memory
SFM*,r,x	A	A5	Store File in Memory
SFS,r,d		B5	Store File in Memory Short Displaced
SFX,r,x		BD	Store File in Memory Short Indexed
SIA,1		26-0	Set Interrupt Active
SIE,1		26-1	Set Interrupt Enable
SIR,1		26-2	Set Interrupt Request
STI,r	V	EE	Store Register in Memory Immediate
STM*,r,x	A	E6	Store Register in Memory
STS,r,d		F6	Store Reg. in Memory Short Displaced
STX,r,x		FE	Store Reg. in Memory Short Indexed
SUI,r	V	E9	Subtract Memory from Register Immediate
SUM*,r,x	A	E1	Subtract Memory from Register
SUR,r,s		69	Subtract Register from Register
SURB,r,s	B	79	Subtract Reg. from Reg. and Branch if Nonzero
SUS,r,d		F1	Subtract Memory from Register Short Displaced
SUX,r,x		F9	Subtract Memory from Register Short Indexed
T			
TBMB*,b,x	A,B	86	Test Bit in Memory and Branch if One
TBRB,r,b	B	76	Test Bit in Register and Branch if One
TBSB,b,d	B	96	Test Bit in Mem. Shrt Disp. and Branch if One
TBXB,b,x	B	9E	Test Bit in Mem. Shrt Indx. and Branch if One
TERB,r,s	B	7E	Test Reg. and Reg. and Br. if any 1's Compare
TOR,r,s		OD.	Trans. 1's Complement Register to Register
TRMB*,r,x	A,B	C6	Test Reg. and Mem. and Branch if any 1's Compare
TRO,r		OE	Transfer and Reset Overflow Status
TRR,r,s		6D	Transfer Register to Register
TRRB,r,s	B	7D	Transfer Reg. to Reg. and Branch if Nonzero
TRSB,r,d	B	D6	Test Reg. and Mem. Sht. Disp. & Br. if any 1's Compare
TRXB,r,x	B	DE	Test Reg. and Mem. Sht. Indx. & Br. if any 1's Compare
TTR,r,s		6F	Transfer 2's Complement Register to Register
TTRB,r,s	B	7F	Trans. 2's Comp. Reg. to Reg. and Br. if Nonzero

MNEMONIC		OP.CODE	DESCRIPTION
X			
XBR,r,b		64	Exclusive OR Bit in Register
XBRB,r,b	B	74	Excl. OR Bit in Register and Branch if Nonzero
XOI,r	V	EC	Exclusive OR Memory and Register Immediate
XOM*,r,x	A	E4	Exclusive OR Memory and Register
XOR,r,s		6C	Exclusive OR Register and Register
XORB,r,s	B	7C	Exclusive OR Reg. and Reg. and Branch if Nonzero
XOS,r,d		F4	Exclusive OR Mem. and Reg. Short Displaced
XOX,r,x		FC	Exclusive OR Mem. and Reg. Short Indexed
Z			
ZBMB*,b,x	A,B	85	Zero Bit in Memory and Branch if Nonzero
ZBMM*,b,x	A	81	Zero Bit in Memory
ZBR,r,b		62	Zero Bit in Register
ZBRB,r,b	B	72	Zero Bit in Register and Branch if Nonzero
ZBSB,b,d	B	95	Zero Bit in Mem. Shrt. Disp. and Branch if Nonzero
ZBSM,b,d		91	Zero Bit in Memory Short Displaced
ZBXB,b,x	B	9D	Zero Bit in Mem. Shrt Indx. and Branch if Nonzero
ZBXM,b,x		99	Zero Bit in Memory Short Indexed
ZRR,r		6C	Zero Register

LISTED BY NUMERIC OP. CODE

OP. CODE	MNEMONIC	DESCRIPTION
00	HLT	Halt
01	RMI	Request Multiprocessor Interrupt
02-07	Unused	
08	MBR,r,s	Move Byte Right Register to Register
09	MBL,r,s	Move Byte Left Register to Register
0A	IBR,r,s	Interchange Bytes Register to Register
0B	MUR,r,s	Move Upper Byte Register to Register
0C	MLR,r,s	Move Lower Byte Register to Register
0D	TOR,r,s	Trans. 1's Complement Register to Register
0E	TRO,r	Transfer and Reset Overflow Status
0F	LRS,r,c	Left Rotate Single
10-1F	Unused	
20	MPR,r,s	Multiply Register by Register
21	DVR,r,s	Divide Register by Register
22	DAR,r,s	Double Precision Add Register to Register
23	REX,n	Request Executive Service
24	CAR	Clear Active Interrupt and Return
25	CIR	Clear Interrupt and Return
26-0	SIA,1	Set Interrupt Active
26-1	SIE,1	Set Interrupt Enable
26-2	SIR,1	Set Interrupt Request
27-0	RIA,1	Reset Interrupt Active
27-1	RIE,1	Reset Interrupt Enable
27-2	RIR,1	Reset Interrupt Request
28	RLD,r,c	Shift Right Logical Double
29	RLS,r,c	Shift Right Logical Single
2A	RAD,r,c	Shift Right Arithmetic Double
2B	RAS,r,c	Shift Right Arithmetic Single
2C	LLD,r,c	Shift Left Logical Double
2D	LLS,r,c	Shift Left Logical Single
2E	LAD,r,c	Shift Left Arithmetic Double
2F	LAS,r,c	Shift Left Arithmetic Single
30-3F	Unused	
40	OCA,r,u	Output Command to I/O Group A
41	OCB,r,u	Output Command to I/O Group B
42	OCC,r,u	Output Command to I/O Group C
43	OCD,r,u	Output Command to I/O Group D
44	ODA,r,u	Output Data to I/O Group A
45	ODB,r,u	Output Data to I/O Group B
46	ODC,r,u	Output Data to I/O Group C
47	ODD,r,u	Output Data to I/O Group D
48	ISA,r,u	Input Status from I/O Group A
49	ISB,r,u	Input Status from I/O Group B
4A	ISC,r,u	Input Status from I/O Group C
4B	ISD,r,u	Input Status from I/O Group D
4C	IDA,r,u	Input Data from I/O Group A

OP. CODE	MNEMONIC		DESCRIPTION
4D	IDB,r,u		Input Data from I/O Group B
4E	IDC,r,u		Input Data from I/O Group C
4F	IDD,r,u		Input Data from I/O Group D
50-5F	Unused		
60	ABR,r,b		Add Bit in Register
61	SBR,r,b		Subtract Bit in Register
62	ZBR,r,b		Zero Bit in Register
63	OBR,r,b		OR Bit in Register
64	XBR,r,b		Exclusive OR Bit in Register
65	LBR,r,b		Load Bit in Register
66	NOP		No Operation
67	GMR,r,b		Generate Mask in Register
68	ADR,r,s		Add Register to Register
69	SUR,r,s		Subtract Register from Register
6A	ETR,r,s		Extract Register from Register
6B	ORR,r,s		OR Register and Register
6C	XOR,r,s		Exclusive OR Register and Register
	ZRR,r		Zero Register
6D	TRR,r,s		Transfer Register to Register
6E	Unused		
6F	TTR,r,s		Transfer 2's Complement Register to Register
70	ABRB,r,b	B	Add Bit in Register and Branch if Nonzero
71	SBRB,r,b	B	Subtract Bit in Register and Branch if Nonzero
72	ZBRB,r,b	B	Zero Bit in Register and Branch if Nonzero
73	OBRB,r,b	B	OR Bit in Register and Branch Unconditionally
74	XBRB,r,b	B	Excl. OR Bit in Register and Branch if Nonzero
75	LBRB,r,b	B	Load Bit in Register and Branch Unconditionally
76	TBRB,r,b	B	Test Bit in Register and Branch if One
77	GMRB,r,b	B	Generate Mask in Register and Branch Unconditionally
78	ADRB,r,s	B	Add Reg. to Reg. and Branch if Nonzero
79	SURB,r,s	B	Subtract Reg. from Reg. and Branch if Nonzero
7A	ETRB,r,s	B	Ext. Reg. from Reg. and Branch if Nonzero
7B	ORRB,r,s	B	OR Register and Register and Branch if Nonzero
7C	XORB,r,s	B	Exclusive OR Reg. and Reg. and Branch if Nonzero
7D	TRRB,r,s	B	Transfer Reg. to Reg. and Branch if Nonzero
7E	TERB,r,s	B	Test Reg. and Reg. and Br. if any 1's Compare
7F	TTRB,r,s	B	Trans. 2's Comp. Reg. to Reg. and Br. if Nonzero
80	ABMM*,b,x	A	Add Bit in Memory
81	ZBMM*,b,x	A	Zero Bit in Memory
82	OBMM*,b,x	A	OR Bit in Memory
83	Unused		
84	ABMB*,b,x	A,B	Add Bit in Memory and Branch if Nonzero
85	ZBMB*,b,x	A,B	Zero Bit in Memory and Branch if Nonzero
86	TBMB*,b,x	A,B	Test Bit in Memory and Branch if One
87	CBMB*,b,x	A,B,B	Compare Bit and Memory
88-8F	Unused		
90	ABSM,b,d		Add Bit in Memory Short Displaced

OP. CODE	MNEMONIC		DESCRIPTION
91	ZBSM,b,d		Zero Bit in Memory Short Displaced
92	OBSM,b,d		OR Bit in Memory Short Displaced
93	Unused		
94	ABSB,b,d	B	Add Bit in Mem. Short Disp. and Branch if Nonzero
95	ZBSB,b,d	B	Zero Bit in Mem. Shrt Disp. and Branch if Nonzero
96	TBSB,b,d	B	Test Bit in Mem. Shrt Disp. and Branch if One
97	CBSB,b,d	B	Compare Bit and Memory Short Displaced
98	ABXM,b,x		Add Bit in Memory Short Indexed
99	ZBXM,b,x		Zero Bit in Memory Short Indexed
9A	OBXM,b,x		OR Bit in Memory Short Indexed
9B	Unused		
9C	ABXB,b,x	B	Add Bit in Mem. Short Indx. and Branch if Nonzero
9D	ZBXB,b,x	B	Zero Bit in Mem. Shrt Indx. and Branch if Nonzero
9E	TBXB,b,x	B	Test Bit in Mem. Shrt Indx. and Branch if One
9F	CBXB,b,x	B	Compare Bit and Memory Short Indexed
A0	MPM*,r,x	A	Multiply Memory by Register
A1	DVM*,r,x	A	Divide Register by Memory
A2-A3	Unused		
A4	LFM*,r,x	A	Load File from Memory
A5	SFM*,r,x	A	Store File in Memory
A6-AD	Unused		
AE	LBX,r,x		Load Byte from Memory
AF	SBX,r,x		Store Byte in Memory
B0	MPS,r,d		Multiply Memory by Register Short Displaced
B1	DVS,r,d		Divide Register by Memory Short Displaced
B2-B3	Unused		
B4	LFS,r,d		Load File from Memory Short Displaced
B5	SFS,r,d		Store File in Memory Short Displaced
B6-B7	Unused		
B8	MPX,r,x		Multiply Memory by Register Short Indexed
B9	DVX,r,x		Divide Register by Memory Short Indexed
BA-BB	Unused		
BC	LFX,r,x		Load File from Memory Short Indexed
BD	SFX,r,x		Store File in Memory Short Indexed
BE-BF	Unused		
C0	ADMM*,r,x	A	Add Register to Memory
C1	ETMM*,r,x	A	Extract Register from Memory
C2	ORMM*,r,x	A	OR Register and Memory
C3	Unused		
C4	ADMB*,r,x	A,B	Add Reg. to Memory and Branch if Nonzero
C5	ETMB*,r,x	A,B	Extract Reg. from Mem. and Branch if Nonzero
C6	TRMB*,r,x	A,B	Test Reg. and Mem. and Branch if any 1's Compare
C7	CRMB*,r,x	A,B,B	Compare Memory and Register
C8-CF	Unused		
D0	ADSM,r,d		Add Register to Memory Short Displaced
D1	ETSM,r,d		Extract Register from Memory Short Displaced
D2	ORSM,r,d		OR Register and Memory Short Displaced

OP. CODE	MNEMONIC		DESCRIPTION
D3	Unused		
D4	ADSB,r,d	B	Add Reg. to Mem. Short Disp. and Branch if Nonzero
D5	ETSB,r,d	B	Ext. Reg. from Mem. Shrt Disp. & Br. if Nonzero
D6	TRSB,r,d	B	Test Reg. and Mem. Shrt Disp. & Br. if any 1's Compare
D7	CRSB,r,d	B,B	Compare Memory and Register Short Displaced
D8	ADXM,r,x		Add Register to Memory Short Indexed
D9	ETXM,r,x		Extract Reg. from Memory Short Indexed
DA	ORXM,r,x		OR Register and Memory Short Indexed
DB	Unused		
DC	ADXB,r,x	B	Add Reg. to Mem. Short Indx. and Branch if Nonzero
DD	ETXB,r,x	B	Ext. Reg. from Mem. Shrt. Indx. & Br. if Nonzero
DE	TRXB,r,x	B	Test Reg. and Mem. Shrt Indx & Br. if any 1's Compare
DF	CRXB,r,x	B,B	Compare Memory and Register Short Indexed
EO	ADM*,r,x	A	Add Memory to Register
E1	SUM*,r,x	A	Subtract Memory from Register
E2	ETM*,r,x	A	Extract Memory from Register
E3	ORM*,r,x	A	OR Memory and Register
E4	XOM*,r,x	A	Exclusive OR Memory and Register
E5	LDM*,r,x	A	Load Register from Memory
E6	STM*,r,x	A	Store Register in Memory
E7	BLM*,r,x	A	Branch and Link
	BRU*,x	A	Branch Unconditionally
E8	ADI,r	V	Add Memory to Register Immediate
E9	SUI,r	V	Subtract Memory from Register Immediate
EA	ETI,r	V	Extract Memory from Register Immediate
EB	ORI,r	V	OR Memory and Register Immediate
EC	XOI,r	V	Exclusive OR Memory and Register Immediate
ED	LDI,r	V	Load Register from Memory Immediate
EE	STI,r	V	Store Register in Memory Immediate
EF	BLI,r		Branch and Link Immediate
FO	ADS,r,d		Add Memory to Register Short Displaced
F1	SUS,r,d		Subtract Memory from Register Short Displaced
F2	ETS,r,d		Extract Memory from Register Short Displaced
F3	ORS,r,d		OR Memory and Register Short Displaced
F4	XOS,r,d		Exclusive OR Mem. and Reg. Short Displaced
F5	LDS,r,d		Load Register from Memory Short Displaced
F6	STS,r,d		Store Reg. in Memory Short Displaced
F7	HOP,d		Branch Short Displaced
F8	ADX,r,x		Add Memory to Register Short Indexed
F9	SUX,r,x		Subtract Memory from Register Short Indexed
FA	ETX,r,x		Extract Memory from Register Short Indexed
FB	ORX,r,x		OR Memory and Register Short Indexed
FC	XOX,r,x		Exclusive OR Mem. and Reg. Short Indexed
FD	LDX,r,x		Load Register from Memory Short Indexed
FE	STX,r,x		Store Reg. in Memory Short Indexed
FF	BRX,x		Branch Short Indexed

r - General Purpose Destination Register (0-15)
s - General Purpose Source Register (0-15)
l - Interrupt Level (0-31)
n - Executive Service Number (0-255)
c - Shift Count (0-15)
u - I/O Unit Number (0-15)
b - Bit Position (0-15)
* - Indirect Addressing
A - Address Operand
x - Index Register
d - Short Displaced Offset (0-15)
V - Value on Immediate Instruction
B - Branch Address
G - I/O Group

```
                          PGM          E$INT
                           INT          F:ANL,E:ANF
                           EXT          E:I35,E:35S,E:SKD,E:035
                           EXT          E.IOF,E:I28,U.TRK,U.GAN,U.BLL
                           EXT          E:SEC,E:MIN,E.UBU,E:ANL,E.SF1
                           EXT          E:MIT,E.350,E.280,E.T08,M:INT
                           EXT          U.CPC,U.CCN,U.CST,U.RTY,U.TM1
                           EXT          U.TM3,U.TM4,E:FRT,E.28F
                           EXT          E:O28,U.TRF,U.AST,U.DIU,U.IHB
                           EXT          U.SLP,U.FAC,U.OTM,E:TSI,E:MTI
                           EXT          E:PWD,E:PAR,E:ABR,F.MTP,B.STT
                           EXT          E.TSF
                      ************************************************************
                      *    CAT NO. 400000-000
                      ************************************************************
                      * LOW MEMORY CONSTANTS
            R  0000        REL
      0000     F700        BRU          ANFNG          RESTART ON CLEAR
      0001  R  0100
            A  0021        ORG          #21
      0021  X  0027        DFC          E:PWD          PWR DOWN/UP ENTRY
            A  0023        ORG          #23
      0023  X  0028        DFC          E:PAR          MEM PARITY ENTRY
            A  003D        ORG          #3D
      003D  X  0029        DFC          E:ABR          CONSOLE INTERRUPT ENTRY
            A  003F        ORG          #3F
      003F  X  0025        DFC          E:TSI          TIME-SLICE INT. ENTRY
            A  0063        ORG          #63
      0063  A  FFD6        DFC          -42            AIS DMP TC
            A  0073        ORG          #73
      0073  X  000C        DFC          E.UBU          AIS DMP TA
            A  008A        ORG          #8A
      008A  X  0001        DFC          E:I35          ASR 35 DI ENTRY
            A  0098        ORG          #98
      0098  X  0006        DFC          E:I28          ASR 28 DI ENTRY
      0099  X  0006        DFC          E:I28          ASR 28 DI ENTRY
            A  00A0        ORG          #A0
      00A0  X  000A        DFC          E:SEC          1 SEC INT ENTRY
      00A1  X  000B        DFC          E:MIN          1 MIN INT ENTRY
      00A2  X  0013        DFC          M:INT          INE INT ENTRY
            A  00A7        ORG          #A7
      00A7  X  0013        DFC          M:INT          INE INT ENTRY
            A  00C4        ORG          #C4
      00C4  X  0026        DFC          E:MTI          MAG TAPE SI ENTRY
            A  00CA        ORG          #CA
      00CA  X  0002        DFC          E:35S          ASR 35 SI ENTRY
            A  00D1        ORG          #D1
      00D1  X  000D        DFC          E:ANL          AIS SI ENTRY
                      ************************************************************
                      * SET PROGRAM ORIGIN
```

```
50          A  0100        ORG          #100
51                   ************************************************************
52                   * START-UP ROUTINE
53          R  0100  E:ANF EQU          $
54     0100     8200  ANFNG OBMM,0       E.SF1                RESET START FLAG
       0101  X  000E
55                   *************************************************************
56                   * THIS SECTION TRANSMITS INITIAL GAIN, TRACKING
57                   *   RATE, AND BLANKING LEVEL SETTINGS TO THE
58                   *   RECEIVER.
59     0102     6C33        ZRR,3
60     0103     E750  XMIT1 BLM,5        E:MIT
       0104  X  000F
61     0105     603F        ABR,3,15
62     0106     ED40        LDI,4        14
       0107  A  000E
63     0108     7943        SURB,4,3     XMIT1
       0109  R  0103
64                   *************************************************************
65                   * INTERRUPT START-UP
66     010A     2780        RIR,#0
67     010B     2700        RIA,#0
68     010C     2640        SIE,#0
69     010D     2781        RIR,#1
70     010E     2701        RIA,#1
71     010F     2641        SIE,#1
72     0110     278C        RIR,#C
73     0111     270C        RIA,#C
74     0112     264C        SIE,#C
75     0113     278D        RIR,#D
76     0114     270D        RIA,#D
77     0115     264D        SIE,#D
78     0116     278E        RIR,#E
79     0117     270E        RIA,#E
80     0118     264E        SIE,#E
81     0119     278F        RIR,#F
82     011A     270F        RIA,#F
83     011B     264F        SIE,#F
84     011C     ED10        LDI,1        #60E1
       011D  A  60E1
85     011E     4210        OCC,1,0                           ENABLE IOIS INTERRUPTS
86     011F     6017        ABR,1,7
87     0120     4210        OCC,1,0                           CLEAR INT. REQUESTS
88                   *************************************************************
89                   * CHANNEL PARAMETER INITIALIZATION:
90     0121     6C33        ZRR,3
91     0122     6C44        ZRR,4
92     0123     655D        LBR,5,13                          =4
93     0124     ED60        LDI,6        -18
       0125  A  FFEE
```

```
 94     0126      E643  PINIT STM,4,3      U.CCN              U.CCN=0
        0127  X   0015
 95     0128      E643        STM,4,3      U.CPC              U.CPC=0
        0129  X   0014
 96     012A      E653        STM,5,3      U.CST              U.CST=4
        012B  X   0016
 97     012C      E663        STM,6,3      U.RTY              U.RTY=-18
        012D  X   0017
 98     012E      E643        STM,4,3      U.IHB              U.IHB=0
        012F  X   0021
 99     0130      603F        ABR,3,15
100     0131      EDF0        LDI,15       14
        0132  A   000E
101     0133      79F3        SURB,15,3    PINIT
        0134  R   0126
102     0135      ED10        LDI,1        -30
        0136  A   FFE2
103     0137      E610        STM,1        U.TM1              U.TM1=-30
        0138  X   0018
104     0139      ED10        LDI,1        -12
        013A  A   FFF4
105     013B      E610        STM,1        U.TM3              GCLOK=-12
        013C  X   0019
106     013D      ED10        LDI,1        -9
        013E  A   FFF7
107     013F      E610        STM,1        U.TM4              TCLOK=-9
        0140  X   001A
108                     ***********************************************************************
109                     * START-UP ASR 35 FOR OPERATOR INPUT
110                     * CLEAR ASR 28 FOR OUTPUT
111     0141      6C11        ZRR,1
112     0142      E610        STM,1        E.350              CLEAR FLAG
        0143  X   0010
113     0144      E610        STM,1        E.280
        0145  X   0011
114     0146      ED10        LDI,1        #4400
        0147  A   4400
115     0148      401A        OCA,1,#A                        TERMINATE
116     0149      4118        OCB,1,8                         TERMINATE
117     014A      4119        OCB,1,9                         ASR 28
118     014B      ED10        LDI,1        #AC00
        014C  A   AC00
119     014D      401A        OCA,1,#A                        READ
120     014E      8200        OBNM,0       E.T08               SCHEDULE STATUS DISPLAY
        014F  X   0012
121                     ***********************************************************************
122                     * LOG RESTART ON ASR 28...
123     0150      6C11        ZRR,1
124     0151      E610        STM,1        E.IOF
        0152  X   0005
```

```
125     0153      E610        STM,1         E.28F
        0154  X   001C
126     0155      E7E0        BLM,14        E:FRT
        0156  X   001B
127     0157  R   0189        DFC           STIME
128     0158      E7E0        BLM,14        E:035
        0159  X   0004
129     015A  R   0198        DFC           MSG1
130     015B      E7E0        BLM,14        E:028
        015C  X   001D
131     015D  R   0173        DFC           MSGO
132                         ***************************************************************
133                         * F:FMT SET-UP
134     015E      ED10        LDI,1         14080
        015F  A   3700
135     0160      E610        STM,1         F.MTP
        0161  X   002A
136     0162      6C11        ZRR,1
137     0163      E610        STM,1         B.STT
        0164  X   002B
138     0165      8100        ZBMM,0        E.TSF
        0166  X   002C
139     0167      E700        BRU           E:SKD
        0168  X   0003
140                         ***************************************************************=
141                         * DUMMY TASKS
142     0169      6C22      F:ANL ZRR,2
143     016A      E620        STM,2         B.STT
        016B  X   002B
144     016C      E620        STM,2         E.IOF
        016D  X   0005
145     016E      E7E0        BLM,14        E:035
        016F  X   0004
146     0170  R   019A        DFC           MSG8
147     0171      E700        BRU           E:SKD
        0172  X   0003
```

```
 149    0173  A  0D0A  MSG0  DFC        #0D0A,#0A0A,#0A0A
        0174  A  0A0A
        0175  A  0A0A
 150    0176  A  2E2E        DFC        |.....SYSTEM RESTART|
        0177  A  2E2E
        0178  A  2E2E
        0179  A  2E2E
        017A  A  2E2E
        017B  A  2E2E
        017C  A  2E2E
        017D  A  2E2E
        017E  A  2E2E
        017F  A  2E2E
        0180  A  5359
        0181  A  5354
        0182  A  454D
        0183  A  2052
        0184  A  4553
        0185  A  5441
        0186  A  5254
 151    0187  A  2041        DFC        | AT |
        0188  A  5420
 152    0189  A  3132  STIME DFC        |123 123456.....|
        018A  A  3320
        018B  A  3132
        018C  A  3334
        018D  A  3536
        018E  A  2E2E
        018F  A  2E2E
        0190  A  2E2E
        0191  A  2E2E
        0192  A  2E2E
        0193  A  2E2E
        0194  A  2E2E
        0195  A  2E2E
        0196  A  2E2E
        0197  A  2E2E
 153    0198  A  0D0A  MSG1  DFC        #0D0A,0
        0199  A  0000
 154    019A  A  0D0A  MSG8  DFC        #0D0A,|F:ANL CALLED|,#0D0A,#0000
        019B  A  463A
        019C  A  414E
        019D  A  4C20
        019E  A  4341
        019F  A  4C4C
        01A0  A  4544
        01A1  A  0D0A
        01A2  A  0000
 155    01A3  R  0100        END        ANFNG

TOTAL ASSEMBLY ERRORS =   0    SIZE =   419
```

```
 1                          PGM          E$SKD
 2                          INT          E:SKD,E.TSK,E:BSK,B.STT,E.TSF
 3                          INT          B.RS1,B.RS2,B.RET
 4                          INT          E.T01,E.T02,E.T03,E.T04,E.T05
 5                          INT          E.T09,E.T10,E.T11,E.T12,E.T13
 6                          INT          E.T06,E.T07,E.T08,E.T14,E.T15
 7                          EXT          F:LOG,U:RTA,E:OMI,M:LEV,M:STD
 8                          EXT          F:FMT,F:DMP,F:ANL,U:PST,E:T28
 9                          EXT          U:RED,E:UIN,E:T35,M:ESC,U:RP3
10                          EXT          E:ANF,E:MAG,B:ORT
11                     *    CAT NO.  400000-001
12                     * THIS IS THE NEW AUTOMATED U SYSTEM SCHEDULER.  TASKS ARE SCHEDULED
13                     *   BY SETTING THE 0 BIT FOR THAT TASK IN THE TASK TABLE.  WHEN THE
14                     *   SCHEDULER FINDS A TASK REQUIRING SERVICE, IT RESETS THE SCHEDULE
15                     *   BIT AND TRANSFERS CONTROL TO THAT ROUTINE.
16     0000     E530  E:SKD LDM,3          MXLIM          R3 FOR COUNTER
       0001  R  002B
17     0002     ED10        LDI,1          E.TSK          USE R1 AS TABLE BASE
       0003  R  001B
18     0004     ED20  SKD1  LDI,2          15
       0005  A  000F
19     0006     8602  SKD2  TBMB,0,2       E.TSK,FOUND    BRANCH IF SCHEDULE BIT IS SET
       0007  R  001B
       0008  R  0016
20     0009     712F        SBRB,2,15      SKD2           DECREMENT INDEX, NEXT TASK
       000A  R  0006
21     000B     713F        SBRB,3,15      SKD1           CONTROL COUNT UNSUCCESFUL PASSES
       000C  R  0004
22     000D     9E01        TBXB,0,1       E:SKD          IS SYSTEM ALREADY DEAD
       000E  R  0000
23     000F     9A01        OBXM,0,1                      SET SYSTEM DEAD FLAG
24     0010     ED50        LDI,5          #1307
       0011  A  1307
25     0012     E740        BLM,4          E:LOG
       0013  X  0001
26     0014     E700        BRU            E:ANF
       0015  X  0010
27     0016     9901  FOUND ZBXM,0,1                      CLEAR DEAD FLAG
28     0017     8102        ZBMM,0,2       E.TSK
       0018  R  001B
29     0019     E70A        BRU*,2         E.TSK
       001A  R  001B
30                     * SYSTEM TASK TABLE, TASKS LISTED IN INVERTED ORDER OF PRIORITY.
31                     * FIRST ENTRY IS THE SYSTEM DEAD FLAG.
32     001B  A  0000  E.TSK DFC            0              SYSTEM DEAD FLAG
33     001C  R  002C  E.T15 DFC            E:BSK          15. BACKGROUND SCHEDULER
34     001D  X  0004  E.T14 DFC            M:LEV          14. GAIN/T.R. HISTORY LOG
35     001E  X  0009  E.T13 DFC            U:PST          13. OPER PARAM. CONTROL
36     001F  X  000D  E.T12 DFC            E:T35          12. ASR 35 TELETYPE ROUTINE
37     0020  X  0011  E.T11 DFC            E:MAG          11. MAG TAPE HANDLER
```

```
 38     0021  X  0012  E.T10 DFC          B:ORT          10. BACKGROUND ABORT
 39     0022  A  0000  E.T09 DFC          0              9.
 40     0023  X  0005  E.T08 DFC          M:STD          8. EQUIPMENT STATUS DISPLAY
 41     0024  X  000F  E.T07 DFC          U:RP3          7. REPORT MSG. GENERATOR
 42     0025  X  0003  E.T06 DFC          E:OMI          6. OPERATOR MESSAGE INTERPRETOR
 43     0026  X  000A  E.T05 DFC          E:T28          5. ASR 28 TELETYPE ROUTINE
 44     0027  X  000B  E.T04 DFC          U:RED          4. CHAN REDUNDANCY TEST
 45     0028  X  000C  E.T03 DFC          E:UIN          3. U DATA INPUT COMPLETE
 46     0029  X  000E  E.T02 DFC          M:ESC          2. EQUIP STATUS CHANGE MONITOR
 47     002A  X  0002  E.T01 DFC          U:RTA          1. REAL TIME DATA ANALYSIS
 48     002B  A  0000  MXLIM DFC          0
 49                    * THIS ROUTINE CONTROLS THE BACKGROUND (NON-REAL TIME) TASKS.
 50     002C     E520  E:BSK LDM,2        B.STT          GET BACKGROUND STATE
        002D  R  0047
 51     002E     ED30        LDI,3        4
        002F  A  0004
 52     0030     E630        STM,3        B.STT          SET BACKGROUND STATE = 5
        0031  R  0047
 53     0032     ED40        LDI,4        E.TSF
        0033  R  0048
 54     0034     9A04        OBXM,0,4                    SET E.TSF TO ENABLE TIME-SLICING
 55     0035     E70A        BRU*,2       BTABL
        0036  R  0037
 56                    * BACKGROUND TASK TABLE.
 57     0037  R  0042  BTABL DFC          BRSET          B.STT = 0
 58     0038  X  0006        DFC          F:FMT          B.STT = 1
 59     0039  X  0007        DFC          F:DMP          B.STT = 2
 60     003A  X  0008        DFC          F:ANL          B.STT = 3
 61     003B  R  003C        DFC          $+1            B.STT = 4
 62                    * IF B.STT = 4, A BACKGROUND TASK IS ALREADY IN EXECUTION.  RESET
 63                    *   REGISTERS AND RESUME PROCESSING.
 64     003C     A410        LFM,1        B.RS1
        003D  R  0049
 65     003E     A4A0        LFM,10       B.RS2
        003F  R  0050
 66     0040     E708        BRU*         B.RET
        0041  R  0056
 67     0042     9904  BRSET ZBXM,0,4                    RESET E.TSF TO INHIGIT TIME-SLICING
 68     0043     E620        STM,2        B.STT          RESET BACKGROUND STATE TO 0
        0044  R  0047
 69     0045     E700        BRU          E:SKD
        0046  R  0000
 70     0047  A  0000  B.STT DFC          0              BACKGROUND STATE
 71     0048  A  0000  E.TSF DFC          0              TIME SLICING FLAG
 72     0049  A  0000  B.RS1 RES          7,0
 73     0050  A  0000  B.RS2 RES          6,0
 74     0056  A  0000  B.RET DFC          0
 75     0057                 END

TOTAL ASSEMBLY ERRORS =   0    SIZE =    87
```

```
 1                          PGM          E$TSI
 2                          INT           E:TSI,B:IOR
 3                          EXT           E.TSF,B.RS1,B.RS2,B.RET,E.T15,
 4                          EXT           E:SKD,E.IOF,E:035,E:MGS
 5                     * THE TIME SLICING INTERRUPT COMES 10 TIMES PER SECOND.  IT IS USED
 6                     *   TO PREVENT BACKGROUND ROUTINES FROM HOLDING ON TO THE PROCESSOR
 7                     *   TOO LONG AND THEREBY HAMPERING THE REAL TIME TASKS.
 8                     * IF THE SYSTEM IS IN A BACKGROUND TASK WHEN THE INTERRUPT OCCURS,
 9                     *   THE SYSTEM SAVES ALL STATUS INFORMATION NECESSARY TO RESUME
10                     *   PROCESSING AND RESCHEDULES THE BACKGROUND TASK IN THE SCHEDULER.
11                     *   IF NO BACKGROUND TASK IS IN EXECUTION, THE INTERRUPT IS IGNORED.
12     0000     8600  E:TSI TBMB,0        E.TSF,TSF1      IS TIME-SLICING ENABLED?
       0001  X  0001
       0002  R  0004
13     0003     2500        CIR                           CLEAR INTERRUPTS AND RETURN
14     0004     A510  TSF1  SFM,1         B.RS1           SAVE REGISTERS
       0005  X  0002
15     0006     A5A0        SFM,10        B.RS2
       0007  X  0003
16     0008     E520        LDM,2         #3E             (FILL IN LOCATION WITH RET. ADDR))
       0009  A  003E
17     000A     E620        STM,2         B.RET           SAVE REENTRY LOCATION
       000B  X  0004
18     000C     8200        OBMM,0        E.T15           RESCHEDULE BACKGROUND SYSTEM
       000D  X  0005
19     000E     8100        ZBMM,0        E.TSF           RESET TIME SLICING FLAG.
       000F  X  0001
20     0010     270F        RIA,#F
21     0011     278F        RIR,#F
22     0012     E700        BRU           E:SKD           RETURN TO SCHEDULER.
       0013  X  0007
23                     * B$IOR IS THE SYSTEM I/O HANDLER FOR BACKGROUND LEVEL TASKS.  THIS
24                     *   ROUTINE WILL TAKE CARE OF NECESSARY HOUSEKEEPING TO RETURN CONTROL
25                     *   TO THE SYSTEM ONCE THE I/O OPERATION HAS BEGUN AND ENSURE
26                     *   CONTINUATION OF THE BACKGROUND TASK ONCE THE I/O HAS BEEN COMPLETED.
27                     * THE CALLING SEQUENCE DEPENDS ON THE DESIRED DEVICE....
28                     *   FOR I/O TO THE ASR 35..
29                     *     BLM,15       B:IOR
30                     *     DFC          (PARAMETER)
31                     *     DFC          (MSG START ADDR.)
32                     *   WHERE OUTPUT CONTINUES TO A NULL CHAR. (#0000)
33                     *   AND FOR I/O TO THE MAG TAPE UNIT..
34                     *     BLM,15       B:IOR
35                     *     DFC          (PARAMETER)
36                     *     DFC          (MSG START ADDR.)
37                     *     DFC          (COUNT OF WORDS)
38                     * PARAMETER WORD INTERPRETATION..
39                     *   BIT 0..0 DO NOT RESCHEDULE BACKGROUND SYSTEM AFTER I/O
40                     *          1 RESCHEDULE BACKGROUND SYSTEM AFTER I/O IS DONE
41                     *   BIT 1..0 NO RESPONSE IS EXPECTED
```

```
 42                     *          1 RESPONSE IS EXPECTED FROM OPERATOR ON ASR 35
 43                     *   BIT 2..0 I/O ON ASR 35
 44                     *          1 I/O ON MAG TAPE
 45                     *   BIT 3..0 INPUT  (REQUEST FOR MAG TAPE ONLY)
 46                     *          1 OUTPUT
 47     0014     A510  B:IOR SFM,1        B.RS1          SAVE REGISTERS
        0015  X  0002
 48     0016     A5A0        SFM,10       B.RS2
        0017  X  0003
 49     0018     FD2F        LDX,2,15                    GET PARAMETER
 50     0019     60FF        ABR,15,15
 51     001A     FD3F        LDX,3,15                    GET MSG START ADDR.
 52     001B     60FF        ABR,15,15
 53     001C     FD4F        LDX,4,15                    GET WORD COUNT FOR MAG TAPE.
 54     001D     8100        ZBMM,0       E.TSF          RESET E.TSF TO INHIBIT INTERRUPT
        001E  X  0001
 55     001F     E620        STM,2        E.IOF          SAVE PARAMETER FOR E:035 USE.
        0020  X  0008
 56     0021     7622        TBRB,2,2     BIOR1          BRU IF MAG TAPE CALL
        0022  R  002C
 57     0023     E630        STM,3        $+4
        0024  R  0027
 58     0025     E7E0        BLM,14       E:035
        0026  X  0009
 59     0027  A  0000        RES          1,0            MSG. START ADDR. PARAMETER
 60     0028     E6F0  BIOR2 STM,15       B.RET          SAVE REENTRY ADDRESS
        0029  X  0004
 61     002A     E700        BRU          E:SKD
        002B  X  0007
 62     002C     E630  BIOR1 STM,3        $+6
        002D  R  0032
 63     002E     E640        STM,4        $+5
        002F  R  0033
 64     0030     E7D0        BLM,13       E:MGS
        0031  X  000A
 65     0032  A  0000        RES          1,0            MSG. START ADDR PARAMETER
 66     0033  A  0000        RES          1,0            WORD COUNT PARAMETER
 67     0034     60FF        ABR,15,15                   MOVE RETURN ADDR. OVER LAST PARM.
 68     0035     E700        BRU          BIOR2
        0036  R  0028
 69     0037                 END

TOTAL ASSEMBLY ERRORS =   0    SIZE =    55
```

```
1          PGM      E$CLK
2           INT      E:SEC,U.TM1,M.TRT,M.GNT
3           INT      M.UPT,E.TM3,E:MIN
4           EXT      M.TM1,E.T02,E:LOG,E.T04,E.T08,U.IHB,U.CST
5           EXT      U.TRK,U.GAN,E.T14
6     *     CAT NO.  400000-003
7     * THIS IS THE SYSTEM SOFTWARE CLOCK.  IT'S TWO ROUTINES, E:SEC AND
8     *   E:MIN, RESPOND TO THE 1/SECOND AND 1/MINUTE TIME INTERRUPTS.
```

```
10                      * E:SEC IS ENTERED VIA THE 1 SECOND TIME PULSE GENERATED BY THE WORLD
11                      *   TIME CLOCK.
12                      *        1. THE 5 SECOND DELAY FOR THE ENTRY TO M:ESC IS COUNTED DOWN.
13                      *        2. THE INPUT OF U DATA IS INITIATED.
14      0000     A510   E:SEC SFM,1          SAVRS          SAVE REGISTERS 1 - 7 FOR USE.
        0001  R  0195
15                      * PULSE TO KEEP ADACS IN AUTO
16      0002     6540         LBR,4,0
17      0003     464E         ODC,4,#E
18      0004     E510         LDM,1          M.TM1          GET DELAY TIMER
        0005  X  0001
19      0006     7D11         TRRB,1,1       $+3            IS TIMER ALREADY ZERO?
        0007  R  0009
20      0008     F706         HOP,SEC01
21      0009     84F0         ABMB,15        M.TM1,SEC01    INCREMENT AND CHECK FOR ZERO
        000A  X  0001
        000B  R  000E
22      000C     8200         OBMM,0         E.T02          SCHEDULE M:SEC IF ZERO
        000D  X  0002
23                      * AIS DATA READ SEQUENCE
24      000E     ED10   SEC01 LDI,1          #4400          SET UP TO READ U DATA
        000F  A  4400
25      0010     4110         OCB,1,0
26      0011     ED10         LDI,1          #4000
        0012  A  4000
27      0013     4110         OCB,1,0
28      0014     ED10         LDI,1          #C829
        0015  A  C829
29      0016     4110         OCB,1,0
30      0017     ED10         LDI,1          #D000
        0018  A  D000
31      0019     4111         OCB,1,1                       INIT. READ
32      001A     4921         ISB,2,#1                      CHECK TO SEE IF BUSY
33      001B     7627         TBRB,2,7       $+3
        001C  R  001E
34      001D     F706         HOP,ANERR
35      001E     8100         ZBMM,0         SFLAG          CLEAR ANALOG SYSTEM FLAG
        001F  R  01A3
36      0020     A410   RETN1 LFM,1          SAVRS
        0021  R  0195
37      0022     2500         CIR                           CLEAR INTERRUPT AND RETURN
38      0023     8600   ANERR TBMB,0         SFLAG,RETN1
        0024  R  01A3
        0025  R  0020
39      0026     8200         OBMM,0         SFLAG          SET ANALOG SYSTEM FLAG
        0027  R  01A3
40      0028     ED50         LDI,5          #1312          GENERATE |AF| MESSAGE
        0029  A  1312
41      002A     E740         BLM,4          E:LOG
        002B  X  0003
```

```
42      002C     E700        BRU          RETN1
        002D  R  0020
```

```
                    * E:MIN IS ENTERED VIA THE 1 MINUTE TIME PULSE GENERATED BY THE WORLD
                    *   TIME CLOCK.
                    *        1. SCHEDULES REDUNDANCY CHECK EVERY 30 MINUTES.
                    *        2. SCHEDULES STATUS DUMP EVERY FOUR HOURS.
                    *        3. SAVES PARAMETER STATUS FOR LATER DUMP.
002E      A510  E:MIN SFM,1          SAVRR          SAVE REGISTERS
002F  R   019C
0030      84F0        ABMB,15        U.TM1,MIN02
0031  R   01A4
0032  R   0039
0033      ED20        LDI,2          -30            TIME TO SCHEDULE REDUN. CHECK
0034  A   FFE2
0035      E620        STM,2          U.TM1          RESET TIMER TO 30 MINUTES
0036  R   01A4
0037      8200        OBMM,0         E.T04          SCHEDULE REDUNDANCY TEST
0038  X   0004
0039      ED10  MIN02 LDI,1          M.TRT          BASE OF TRACK RATE TABLE IN R1
003A  R   008B
003B      ED20        LDI,2          M.GNT          BASE OF GAIN TABLE IN R2
003C  R   0117
003D      ED30        LDI,3          -1             R3 FOR CHANNEL POINTER
003E  A   FFFF
003F      80F0        ABMM,15        E.TM3          INCRIMENT SYSTEM UP TIMER
0040  R   01A5
0041      603F  MIN04 ABR,3,15                      NEXT CHANNEL
0042      8603        TBMB,0,3       U.IHB,MIN03    BYPASS OPERATION ON PROC. INHIBITED
0043  X   0006
0044  R   005B
0045      E543        LDM,4,3        U.CST          GET CHANNEL STATUS
0046  X   0007
0047      714F        SBRB,4,15      MIN03          BRANCH IF CHANNEL NOT UP
0048  R   0058
0049      80F3        ABMM,15,3      M.UPT          LOG CHANNEL AS UP
004A  R   0187
004B      E543        LDM,4,3        U.TRK          PUT TRACK RATE IN R4
004C  X   0008
004D      6841        ADR,4,1                       CELL POINTER IN R4
004E      98F4        ABXM,15,4                     INC. COUNTER FOR THIS T.R. ON CHAN.
004F      6C44        ZRR,4
0050      E553        LDM,5,3        U.GAN          PUT CHAN IN R5
0051  X   0009
0052      ED60        LDI,6          #3
0053  A   0003
0054      2146        DVR,4,6                       DIVIDE GAIN BY 4
0055      765C        TBRB,5,12      $+3            PUT |24| IN LAST GROUP
0056  R   0058
0057      F702        HOP,$+2                       (GAIN NOT 24)
0058      615F        SBR,5,15                      MOVE BACK TO LAST GOOP.
0059      6852        ADR,5,2                       CELL POINTER TO PRO;ER GROUP
005A      98F5        ABXM,15,5                     INC. COUNT IN CELL
```

```
 75   005B     ED40  MIN03 LDI,4          10
      005C  A  000A
 76   005D     6814        ADR,1,4                       MOVE TO BASE FOR NEXT CHAN. (+10)
 77   005E     614E        SBR,4,14
 78   005F     6824        ADR,2,4                       MOVE TO BASE FOR NEXT CHAN. (+8)
 79   0060     ED40        LDI,4          -13
      0061  A  FFF3
 80   0062     7843        ADRB,4,3       MIN04          LOOP IF LAST CHAN. NOT DONE
      0063  R  0041
 81   0064     ED10        LDI,1          #4000          SET UP TO READ DOY/TIME GROUP
      0065  A  4000
 82   0066     431F        OCD,1,#F
 83   0067     4F2F        IDD,2,#F
 84   0068     4F3F        IDD,3,#F                      TIME GROUP IN R2,R3
 85   0069     0D22        TOR,2,2
 86   006A     0D33        TOR,3,3
 87   006B     2C29        LLD,2,9
 88   006C     EA20        ETI,2          #8180          PUT HR/MIN IN R2
      006D  A  8180
 89                    *  HOURS AND MINS IN R2.  CHECK TIME TABLES TO SEE
 90                    *   IF ITS TIME TO SCHEDULE M$LEV OR M$STD.
 91   006E     ED10        LDI,1          -6
      006F  A  FFFA
 92   0070     6D32  MIN01 TRR,3,2                       COPY TIME
 93   0071     E131        SUM,3,1        LEVTB+6        CHECK AGAINST TABLE
      0072  R  01AC
 94   0073     7D33        TRRB,3,3       $+3
      0074  R  0076
 95   0075     F704        HOP,MIN06                     FOUND IN TABLE
 96   0076     701F        ABRB,1,15      MIN01
      0077  R  0070
 97   0078     F703        HOP,MIN05
 98   0079     8200  MIN06 OBMM,0         E.T14          SCHEDULE M$LEV
      007A  X  000A
 99   007B     ED10  MIN05 LDI,1          -24
      007C  A  FFE8
100   007D     6D32  MIN07 TRR,3,2                       COPY TIME
101   007E     E131        SUM,3,1        STDTB+24       CHECK VS. TABLE
      007F  R  01C4
102   0080     7D33        TRRB,3,3       $+3
      0081  R  0083
103   0082     F704        HOP,MIN08                     FOUND IN TABLE
104   0083     701F        ABRB,1,15      MIN07
      0084  R  007D
105   0085     F703        HOP,$+3
106   0086     8200  MIN08 OBMM,0         E.T08          SCHEDULE M$STD
      0087  X  0005
107   0088     A410        LFM,1          SAVRR          CLEAR INTERRUPT AND RETURN
      0089  R  019C
108   008A     2500        CIR
```

```
                        * M.TRT IS A TABLE OF TRACK RATE SETTINGS.
                        *      TR......
                        * CHAN  0  1  2  3  4  5  6  7  8  9
                        *    0
                        *    1
                        *    .
                        *    .
                        *   13
     008B  A  0000      M.TRT RES            140,0
                        * M.GNT IS A TABLE OF GAIN SETTINGS
                        *      GAIN.......
                        * CHAN  0  1  2  3  4  5  6  7
                        *    0
                        *    1
                        *    .
                        *    .
                        *   13
     0117  A  0000      M.GNT RES            112,0
                        * M.UPT IS A TABLE OF UP TIME
     0187  A  0000      M.UPT RES            14,0
     0195               SAVRS RES            7
     019C               SAVRR RES            7
     01A3  A  0000      SFLAG DFC            0              ANALOG SUBSYSTEM ERROR FLAG
     01A4  A  FFE2      U.TM1 DFC            -30            REDUNDANCY CHECK TIMER
     01A5  A  0000      E.TM3 DFC            0              SYSTEM UP TIMER
                        * TABLE OF TIMES TO CALL M$LEV
     01A6  A  0000      LEVTB DFC            #0000          0000 HRS
     01A7  A  1000            DFC            #1000          0800 HRS
     01A8  A  2C00            DFC            #2C00          1600 HRS
     01A9  A  0000            RES            3,0            (EXPAND 3 TIMES)
                        * TABLE OF TIMES TO CALL M$STD
     01AC  A  0400      STDTB DFC            #0400          0200 HRS
     01AD  A  0C00            DFC            #0C00          0600 HRS
     01AE  A  2000            DFC            #2000          1000 HRS
     01AF  A  2800            DFC            #2800          1400 HRS
     01B0  A  3000            DFC            #3000          1800 HRS
     01B1  A  4400            DFC            #4400          2200 HRS
     01B2  A  0000            RES            18,0           (EXPAND 18 TIMES)
     01C4                     END

TOTAL ASSEMBLY ERRORS =   0    SIZE =   452
```

```
 1                          PGM          E$UIN
 2                           INT          E:UIN,E.UBF,E:MIT,E.SFI,E:ANL
 3                           INT          E.UBU
 4                           EXT          U.IHB,U.CYC,U.TRK,U.GAN,U.BLL,E:SKD,U.WRK
 5                           EXT          E.T01,E.T03
 6                     *     CAT NO.  400000-009
 7                     * E$UIN IS ENTERED AT THE COMPLETION OF EACH TRANSFER OF U-DATA VIA
 8                     *   THE ANALOG SUBSYSTEM.
 9     0000     ED10  E:UIN LDI,1        E.UBF          POINTER TO NEXT ROW
       0001  R  00C5
10           R  0001  UIN1  EQU          $-1
11     0002     ED70        LDI,7        -42            42 SAMPLES
       0003  A  FFD6
12     0004     6C33        ZRR,3                       INIT. CHANNEL
13     0005     E527  UINLP LDM,2,7      E.UBU+42       GET AMP VALUE
       0006  R  00C5
14     0007     607F        ABR,7,15                    NEXT LOAD LOC.
15     0008     7620        TBRB,2,0     NEGAM          IS SIGN BIT SET?
       0009  R  000D
16     000A     EA20        ETI,2        #F800          CLEAR GARBAGE
       000B  A  F800
17     000C     F702        HOP,$+2
18     000D     6C22  NEGAM ZRR,2                       NO NEG AMP PERMITTED
19     000E     FE21        STX,2,1                     STORE AMP AWAY
20     000F     601F        ABR,1,15                    NEXT STORE LOC.
21     0010     E527        LDM,2,7      E.UBU+42       GET FAZ VALUE
       0011  R  00C5
22     0012     607F        ABR,7,15                    NEXT LOAD LOC.
23     0013     8603        TBMB,0,3     U.IHB,STRFZ    NO FAZ ON INHIBITTED CHANNEL
       0014  X  0001
       0015  R  007C
24     0016     7620        TBRB,2,0     NEGFZ
       0017  R  001B
25     0018     EA20        ETI,2        #F800          CLEAR GARBAGE
       0019  A  F800
26     001A     F702        HOP,$+2
27     001B     6C22  NEGFZ ZRR,2
28     001C     6D42        TRR,4,2
29     001D     E940        SUI,4        240            SUB 15 MICROSEC
       001E  A  00F0
30     001F     7640        TBRB,4,0     LOFAZ          AND BRANCH IF NEG.
       0020  R  0078
31     0021     E940        SUI,4        1120           SUB ANOTHER 60 MICROSEC
       0022  A  0460
32     0023     7640        TBRB,4,0     STFAZ          AND BRANCH IF NEG.
       0024  R  0030
33     0025     ED40        LDI,4        800            SET CYCLE FLAG
       0026  A  0320
34     0027     E643  UIN2  STM,4,3      U.CYC
       0028  X  0002
```

```
35    0029      6320        OBR,2,0                      SET BIT IN DATA WORD
36    002A      82F0        OBMM,15       SHIFT          CYCLE SHIFT BIT
      002B  R   027D
37    002C      E750        BLM,5         E:MIT           SEND SHIFT
      002D  R   0083
38    002E      81F0        ZBMM,15       SHIFT          CLEAR SHIFT BIT
      002F  R   027D
39    0030      FE21  STFAZ STX,2,1                      STORE FAZ AWAY
40    0031      601F        ABR,1,15                     NEXT STORE LOC.
41    0032      E527        LDM,2,7       E.UBU+42       GET BLANK LEVEL VALUE
      0033  R   00C5
42    0034      7620        TBRB,2,0      NEGBL          IS BLL NEG.?
      0035  R   0039
43    0036      EA20        ETI,2         #F800          CLEAR GARBAGE BITS
      0037  A   F800
44    0038      F702        HOP,$+2
45    0039      6C22  NEGBL ZRR,2                        CLEAR BLL TO 0
46    003A      FE21        STX,2,1
47    003B      601F        ABR,1,15
48    003C      603F        ABR,3,15                     NEXT CHAN.
49    003D      707F        ABRB,7,15     UINLP          LOOP THRU 42 SAMPLES
      003E  R   0005
50    003F      ED40        LDI,4         #4000          READ TIME GROUP TO END OF ROW
      0040  A   4000
51    0041      434F        OCD,4,#F
52    0042      4F5F        IDD,5,#F
53    0043      0D55        TOR,5,5
54    0044      FE51        STX,5,1                      STORE UPPER HALF
55    0045      601F        ABR,1,15
56    0046      4F5F        IDD,5,#F
57    0047      0D55        TOR,5,5
58    0048      FE51        STX,5,1                      STORE LOWER HALF
59    0049      601F        ABR,1,15
60    004A      E610        STM,1         UIN1           TOP OF NEXT ROW
      004B  R   0001
61    004C      8600        TBMB,0        E.SF1,START    START UP IF FLAG SET
      004D  R   027F
      004E  R   006A
62    004F      84F0        ABMB,15       SCONT,E:SKD    TEN SAMPLES YET
      0050  R   027E
      0051  X   0006
63    0052      ED20  UPDAT LDI,2         -440            YES, MOVE BUFFER TO WORKING STORE
      0053  A   FE48
64    0054      ED30        LDI,3         U.WRK
      0055  X   0007
65    0056      E830        ADI,3         44
      0057  A   002C
66    0058      E512  LOOP1 LDM,1,2       E.UBF+440       GET NEXT VALUE
      0059  R   027D
67    005A      FE13        STX,1,3                        STORE IT
```

```
68    005B     603F        ABR,3,15                    MOVE WORKING AREA POINTER
69    005C     702F        ABRB,2,15     LOOP1          LOOP THRU BUFFER THEN QUIT
      005D  R  0058
70    005E     8200        OBMM,0        E.T01         SCHEDULE ANALYSIS
      005F  X  0008
71    0060     ED10  UIN3  LDI,1         -10
      0061  A  FFF6
72    0062     E610        STM,1         SCONT         RESET SAMPLE COUNTER
      0063  R  027E
73    0064     ED10        LDI,1         E.UBF
      0065  R  00C5
74    0066     E610        STM,1         UIN1
      0067  R  0001
75    0068     E700        BRU           E:SKD         RETURN
      0069  X  0006
76    006A     8100  START ZBMM,0        E.SF1         RESET START FLAG
      006B  R  027F
77    006C     ED20        LDI,2         -44
      006D  A  FFD4
78    006E     ED30        LDI,3         U.WRK         SET ROW 1 OF WORKING STORAGE
      006F  X  0007
79    0070     E512  LOOP2 LDM,1,2       E.UBF+44      GET NEXT VALUE
      0071  R  00F1
80    0072     FE13        STX,1,3                       STORE
81    0073     603F        ABR,3,15                    MOVE POINTER AND
82    0074     702F        ABRB,2,15     LOOP2          LOOP
      0075  R  0070
83    0076     E700        BRU           UIN3          RESET AND RETURN
      0077  R  0060
84    0078     ED40  LOFAZ LDI,4         -800          SET CYCLE FLAG FOR -50 MICROSEC.
      0079  A  FCE0
85    007A     E700        BRU           UIN2
      007B  R  0027
86    007C     EA20  STRFZ ETI,2         #F800         CLEAR GARBAGE BITS
      007D  A  F800
87    007E     E700        BRU           STFAZ        STORE AWAY
      007F  R  0030
```

```
                        * INTERRUPT RESPONSE ROUTINE, SCHEDULES E:UIN
 0080      8200         E:ANL OBMM,0        E.T03
 0081  X   0009
 0082      2500               CIR
```

```
                        * E$MIT IS THE ROUTINE WHICH TRANSMITS DIGITAL DATA TO THE RECEIVER
                        *   FROM THE APROCESSOR.
                        *   CALLING SEQUENCE......
                        *     BLM,5          E:MIT
                        *     WITH CHANNEL DESIGNATOR IN R3 (0 FOR A, ETC.)
 0083      A560       E:MIT SFM,6          SVR67          SAVE R6, R7 FOR INTERNAL USE
 0084  R   0099
 0085      E563             LDM,6,3        U.TRK          TRACK RATE IN BITS 0 - 3.
 0086  X   0003
 0087      2D65             LLS,6,5                       MAKE ROOM FOR GAIN
 0088      E363             ORM,6,3        U.GAN
 0089  X   0004
 008A      2D66             LLS,6,6
 008B      E363             ORM,6,3        U.BLL          ADD IN BLANKING LEVEL IN BITS 9 - 14
 008C  X   0005
 008D      2D61             LLS,6,1                       MAKE ROOM FOR SHIFT BIT
 008E      E360             ORM,6          SHIFT          PUT SHIFT BIT IN BIT 15, OUTPT READY
 008F  R   027D
 0090      6D73             TRR,7,3
 0091      E870             ADI,7          #4660
 0092  A   4660
 0093      E670             STM,7          $+2
 0094  R   0095
 0095  A   0000             DFC            0              EXECUTE OUTPUT
 0096      A460             LFM,6          SVR67          RESTORE REGISTERS
 0097  R   0099
 0098      FF05             BRX,5                         RETURN
 0099                 SVR67 RES            2
                        * INPUT BUFFER................
                        *  TIME/VALUE
                        *   0   AMPA FAZA BLNA AMP3 FAZB BLNB ..............AMPN FAZN BLNN TIME~
                        *  +1   AMPA FAZA BLNA ...........
                        *  +2   AMPA FAZA BLNA ...........
                        *  +3   AMPA FAZA BLNA ...........
                        *  ....... THRU .......
                        *  +9   AMPA FAZA BLNA ...........
                        *  OR (14 CHANS * 3 INPUTS + TIME)* 10 SECONDS = 440 WORDS
 0098  A   0000       E.UBU RES            42,0
 00C5  A   0000       E.UBF RES            440,0          INPUT BUFFER
 027D  A   0000       SHIFT DFC            0              CYCLE SHIFT BIT
 027E  A   FFF6       SCONT DFC            -10            SAMPLE COUNTER
 027F  A   0000       E.SFI DFC            0              START FLAG
 0280                       END

TOTAL ASSEMBLY ERRORS =   0    SIZE =   640
```

```
 1                    PGM          E$SUB
 2                     INT          E:PWD,E:PAR,E:ABR,B:ORT
 3                     EXT          E:FRT,E.TM1,E.TM2,E:FCT,E.28F
 4                     EXT          E:028,E:ANF,B.STT,E.350,E.T10
 5                     EXT          E.IOF,E:035,E:SKD
 6                *    CAT NO. 400000-019
 7                * E:PWD POWER DOWN SYSTEM INTERRUPT
 8                * E:PWU POWER UP SYSTEM INTERRUPT
 9                * E:PAR MEMORY PARITY ERROR SYSTEM INTERRUPT
10                * E:ABR CONSOLE INTERRUPT
```

```
                        ********************************************************
                        * E:PWD IS ENTERED JUST BEFORE THE PROCESSOR POWER
                        *   DROPS OUT.
0000        ED10        E:PWD LDI,1        E:PWU
0001   R    0010
0002        E610              STM,1        #21
0003   A    0021
0004        ED10              LDI,1        #4000          READ PWR DOWN TIME
0005   A    4000
0006        431F              OCD,1,#F
0007        4F2F              IDD,2,#F
0008        0D22              TOR,2,2
0009        E620              STM,2        PWDT1
000A   R    006F                                                  .
000B        4F2F              IDD,2,#F
000C        0D22              TOR,2,2
000D        E620              STM,2        PWDT1+1
000E   R    0070
000F        F700              HOP,$                       WAIT FOR PWR LOSS
```

```
27                      ********************************************************
28                      * E:PWU IS ENTERED WHEN POWER IS RESTORED.
29      0010     ED10   E:PWU LDI,1        E:PWD          RESET DOWN ENTRY
        0011  R  0000
30      0012     E610         STM,1        #21
        0013  A  0021
31      0014     E7E0         BLM,14       E:FRT          POWER UP TIME
        0015  X  0001
32      0016  R  007C         DFC          PMS1
33      0017     E510         LDM,1        PWDT1
        0018  R  006F
34      0019     E610         STM,1        E.TM1
        001A  X  0002
35      001B     E510         LDM,1        PWDT1+1
        001C  R  0070
36      001D     E610         STM,1        E.TM2
        001E  X  0003
37      001F     E7E0         BLM,14       E:FCT
        0020  X  0004
38      0021  R  0073         DFC          PWRMS+2
39      0022     6C11         ZRR,1
40      0023     E610         STM,1        E.28F
        0024  X  0005
41      0025     E7E0         BLM,14       E:028          LOG DOWN/UP
        0026  X  0006
42      0027  R  0071         DFC          PWRMS
43      0028     E700         BRU          E:ANF
        0029  X  0007
```

```
                    ************************************************************
                    * E:PAR IS ENTERED WHEN A MEMORY PARITY ERROR IS
                    *   DETECTED.
     002A     E7E0  E:PAR BLM,14        E:FRT
     002B  X  0001
     002C  R  0087        DFC           PARMS+2
     002D     E570        LDM,7         #22
     002E  A  0022
     002F     ED30        LDI,3         -2
     0030  A  FFFE
     0031     6C66  PAR1  ZRR,6
     0032     2C64        LLD,6,4
     0033     0926        MBL,2,6                         FIRST DIGIT
     0034     E960        SUI,6         #A
     0035  A  000A
     0036     7660        TBRB,6,0      $+5
     0037  R  003B
     0038     E820        ADI,2         #3700             DIGIT 0-9
     0039  A  3700
     003A     F703        HOP,$+3
     003B     E820        ADI,2         #3000
     003C  A  3000
     003D     6C66        ZRR,6
     003E     2C64        LLD,6,4
     003F     6826        ADR,2,6
     0040     E960        SUI,6         #A
     0041  A  000A
     0042     7660        TBRB,6,0      $+5
     0043  R  0047
     0044     E820        ADI,2         #37
     0045  A  0037
     0046     F703        HOP,$+3
     0047     E820        ADI,2         #30
     0048  A  0030
     0049     E623        STM,2,3       PARS1+4
     004A  R  0093
     004B     703F        ABRB,3,15     PAR1
     004C  R  0031
     004D     6C66        ZRR,6
     004E     E660        STM,6         E.28F
     004F  X  0005
     0050     E7E0        BLM,14        E:028
     0051  X  0006
     0052  R  0085        DFC           PARMS             LOG MP FOUND
     0053     80F0        ABMM,15        PARCT
     0054  R  0094
     0055     E510        LDM,1         PARCT
     0056  R  0094
     0057     7610        TBRB,1,0      E:ANF             TRY TWO RESTARTS
     0058  X  0007
```

```
77    0059    2740    RIE,#0
78    005A    2741    RIE,#1
79    005B    274C    RIE,#C
80    005C    274D    RIE,#D
81    005D    274E    RIE,#E
82    005E    274F    RIE,#F
83    005F    F700    HOP,$                    KILL SYSTEM
```

```
                        ************************************************************
                        * CONSOLE INTERRUPT USED TO ABORT BACKGROUND PROGRAM
 0060      8200         E:ABR OBMM,0        E.T10
 0061  X   000A
 0062      2500               CIR                          RETURN
                        ************************************************************
                        * B:ORT LOGS THE OPERATOR INDUCED ABORTION.
 0063      6C11         B:ORT ZRR,1
 0064      E610               STM,1        B.STT           ABORT TASK
 0065  X   0008
 0066      E610               STM,1        E.350           CLEAR ASR 35
 0067  X   0009
 0068      E610               STM,1        E.IOF
 0069  X   000B
 006A      E7E0               BLM,14       E:035
 006B  X   000C
 006C  R   0095               DFC          BMSG
 006D      E700               BRU          E:SKD
 006E  X   000D
```

```
 99                    ************************************************************
100     006F  A  0000  PWDT1 RES          2,0            POWER TIME
101     0071  A  0A0A  PWRMS DFC          #0A0A,#0D0A,|123 123456  T PF|,#0D0A
        0072  A  0D0A
        0073  A  3132
        0074  A  3320
        0075  A  3132
        0076  A  3334
        0077  A  3536
        0078  A  2020
        0079  A  5420
        007A  A  5046
        007B  A  0D0A
102     007C  A  3132  PMS1  DFC          |123 123456  T PR|,0
        007D  A  3320
        007E  A  3132
        007F  A  3334
        0080  A  3536
        0081  A  2020
        0082  A  5420
        0083  A  5052
        0084  A  0000
103     0085  A  0D0A  PARMS DFC          #0D0A,#0D0A,|123 123456  T MP|
        0086  A  0D0A
        0087  A  3132
        0088  A  3320
        0089  A  3132
        008A  A  3334
        008B  A  3536
        008C  A  2020
        008D  A  5420
        008E  A  4D50
104     008F  A  2041  PARS1 DFC          | AT 0000|,0
        0090  A  5420
        0091  A  3030
        0092  A  3030
        0093  A  0000
105     0094  A  FFFE  PARCT DFC          -2
106     0095  A  0D0A  BMSG  DFC          #0D0A,|BACKGROUND TASK ABORTED |
        0096  A  4241
        0097  A  434B
        0098  A  4752
        0099  A  4F55
        009A  A  4E44
        009B  A  2054
        009C  A  4153
        009D  A  4B20
        009E  A  4142
        009F  A  4F52
        00A0  A  5445
```

```
          00A1  A  4420
 107      00A2  A  4259          DFC          |BY OPERATOR.|,#0D0A,0
          00A3  A  204F
          00A4  A  5045
          00A5  A  5241
          00A6  A  544F
          00A7  A  522E
          00A8  A  0D0A
          00A9  A  0000
 108      00AA                   END
```

TOTAL ASSEMBLY ERRORS = 0 SIZE = 170

```
                                PGM          E$OMI
                                 INT          E:OMI
                                 EXT          E.35I,E:035,E.IOF,E:028,E.3IC
                                 EXT          E:SKD,B.STT,E.T15,E.T08,E.T04
                                 EXT          E:FRT,E.T13,E.28F
                          *      CAT NO.  400000-002
                          * THIS IS THE OPERATOR'S MESSAGE INTERPRETOR ROUTINE.  IT IS SCHEDULED
                          *   IN RESPONSE TO AN OPERATOR MESSAGE VIA THE ASR 35.  E$OMI EXAMINES
                          *   THE MESSAGE FOR FORMAT VALIDITY AND SCHEDULES APPROPRIATE TASKS IN ~
                          *   RESPONSE.
0000      A440  E:OMI LEM,4          E.35I          GET FIRST 4 INPUT CHARS.
0001  X   0001
0002      0966        MBL,6,6                       PACK CHARS. IN R6 AND R7
0003      6B76        ORR,7,6
0004      0964        MBL,6,4
0005      6B65        ORR,6,5
0006      ED50        LDI,5          -28            SET TABLE POINTER FOR FIRST ENTRY
0007  A   FFE4
0008      6D26  OMI1  TRR,2,6                       COPY KEYWORD IN R2,R3
0009      6D37        TRR,3,7
000A      E425        XOM,2,5        MSGTB+28       DO THESE MATCH?
000B  R   0112
000C      7D22        TRRB,2,2       OMI2             NO...
000D  R   0014
000E      E435        XOM,3,5        MSGTB+29         MAYBE...
000F  R   0113
0010      7D33        TRRB,3,3       OMI2             NO...
0011  R   0014
0012      E700        BRU            FOUND            YES..
0013  R   0020
0014      705D  OMI2  ABRB,5,13      OMI1           NEXT ENTRY IF ANY UNCHECKED.
0015  R   0008
0016      7607        TBRB,0,7       OMI6
0017  R   005E
0018      6C44  OMI7  ZRR,4
0019      E640        STM,4          E.ICF          SEND MSG. TO OPERATOR ON ASR 35
001A  X   0003
001B      F7E0        BLM,14         E:035           |INVALID KEYWORD, MSG. IGNORED|
001C  X   0002
001D  R   0112        DFC            MSG1
001E      E700        BRU            E:SKD
001F  X   0006
                      * MATCH FOUND.........
                      *  SET UP DESIRED OPERATION
0020      8605  FOUND TBMB,0,5       MSGTB+30,TLOG  BIT 0 SET FOR LOG INPUT
0021  R   0114
0022  R   002F
0023      8615        TBMB,1,5       MSGTB+30,TSET  BIT 1 SET FOR MAJOR TASK REQUEST
0024  R   0114
0025  R   0058
```

```
35    0026      F525        LDM,2,5      MSGTB+30     BACKGROUND TASK REQUEST, GET B.STT
      0027  R   0114
36    0028      0C22        MLR,2,2                   CLEAR UPPER BYTE
37    0029      E620        STM,2        B.STT
      002A  X   0007
38    002B      8200        OBMM,0       E.T15        SCHEDULE BACKGROUND TASK.
      002C  X   0008
39    002D      E700        BRU          E:SKD        RETURN
      002E  X   0006
40    002F      E7E0  TLOG  BLM,14       E:FRT        GET REAL TIME AND FORMAT FOR OUTPUT
      0030  X   000B
41    0031  R   0125        DFC          MSG2+1
42    0032      ED20        LDI,2        E.35I
      0033  X   0001
43    0034      602D        ABR,2,13                  ADDR OF FIFTH INPUT CHARACTER
44    0035      6C33        ZRR,3                     OUTPUT BUFFER POINTER
45    0036      FD42  OMI3  LDX,4,2                   GET NEXT CHARACTER
46    0037      7D54        TRRB,5,4     $+4          BRANCH ON END OF MESSAGE
      0038  R   003B
47    0039      E700        BRU          OMI4
      003A  R   004E
48    003B      0955        MBL,5,5
49    003C      602F        ABR,2,15
50    003D      FD42        LDX,4,2                   GET NEXT CHARACTER
51    003E      7D44        TRRB,4,4     $+4          BRANCH ON END OF MESSAGE
      003F  R   0042
52    0040      E700        BRU          OMI5
      0041  R   0049
53    0042      6B54        ORR,5,4
54    0043      E653        STM,5,3      MSG2A
      0044  R   012C
55    0045      603F        ABR,3,15
56    0046      602F        ABR,2,15
57    0047      E700        BRU          OMI3
      0048  R   0036
58    0049      E350  OMI5  ORM,5        SPACE        FILL WORD WITH SPACE CHARACTER
      004A  R   0123
59    004B      E653        STM,5,3      MSG2A
      004C  R   012C
60    004D      603F        ABR,3,15
61    004E      6C55  OMI4  ZRR,5
62    004F      E653        STM,5,3      MSG2A        MESSAGE TERMINATOR
      0050  R   012C
63    0051      E650        STM,5        E.28F
      0052  X   000D
64    0053      E7E0        BLM,14       E:O28
      0054  X   0004
65    0055  R   0124        DFC          MSG2
66    0056      E700        BRU          E:SKD        RETURN
      0057  X   0006
```

```
67      0058      E545  TSET  LDM,4,5       MSGTB+31       GET E$SKD ENTRY
        0059  R   0115
68      005A      8204        OBMM,0,4      0              SET SCHEDULE BIT FOR THAT ENTRY
        005B  A   0000
69      005C      E700        BRU           E:SKD          AND RETURN.
        005D  X   0006
```

```
                        ***************************************************************
                        * IF BIT 7 IS SET IN THE SWITCH REGISTER, WE ENABLE
                        *   TWO ADDITIONAL OPERATOR REQUESTS:
                        *    DIS:HHHH   DISPLAY CONTENTS OF #HHHH ON ASR 35
                        *    SET:HHHH=CCCC   STORE #CCCC IN #HHHH
     005E       6D26    OMI6  TRR,2,6
     005F       6D37          TRR,3,7
     0060       EC20          XOI,2          #4449          |DI|
     0061   A   4449
     0062       7D22          TRRB,2,2       OMI8           NOT DIS REQUEST
     0063   R   006A
     0064       EC30          XOI,3          #533A          |S:|
     0065   A   533A
     0066       7D33          TRRB,3,3       OMI8           NOT DIS REQUEST
     0067   R   006A
     0068       E700          BRU            DISPL
     0069   R   0086
     006A       6D26    OMI8  TRR,2,6
     006B       6D37          TRR,3,7
     006C       EC20          XOI,2          #5345          |SE|
     006D   A   5345
     006E       7D22          TRRB,2,2       OMI7           NOT SET REQUEST
     006F   R   0018
     0070       EC30          XOI,3          #543A          |T:|
     0071   A   543A
     0072       7D33          TRRB,3,3       OMI7           NOT SET REQUEST
     0073   R   0018
                        * SET: REQUEST FOUND
     0074       ED10          LDI,1          E.35I
     0075   X   0001
     0076       601D          ABR,1,13                      POINT TO FIRST DIGIT
     0077       E7E0          BLM,14         GETHX          GET ADDR IN R4
     0078   R   00A9
     0079       6DF4          TRR,15,4                      HOLD ADDR.
     007A       FD51          LDX,5,1                       CHECK FOR = SIGN
     007B       601F          ABR,1,15
     007C       F950          SUI,5          #003D
     007D   A   003D
     007E       7D55          TRRB,5,5       FMTER          NOT PROPER FORMAT
     007F   R   00EE
     0080       E7E0          BLM,14         GETHX
     0081   R   00A9
                        * SET LOCATION TO VALUE
     0082       FE4F          STX,4,15                      STORE VAL
     0083       6D4F          TRR,4,15
     0084       E700          BRU            DISP1          LOG CHANGE
     0085   R   008B
                        * DIS: REQUEST FOUND
     0086       ED10    DISPL LDI,1          E.35I
     0087   X   0001
```

```
105     0088     601D        ABR,1,13
106     0089     E7E0        BLM,14        GETHX          GET ADDR TO BE DISPLAYED
        008A  R  00A9
107     008B     FD54  DISP1 LDX,5,4                      GET VALUE
108                    * DISPLAY ADDRESS IN R4 AND VALUE IN R5
109     008C     ED10        LDI,1         MSG2A
        008D  R  012C
110     008E     EDF0        LDI,15        #203C
        008F  A  203C
111     0090     FEF1        STX,15,1                     STORE | <| FOR OUTPUT
112     0091     601F        ABR,1,15
113     0092     6D74        TRR,7,4                      R7=ADDR
114     0093     E7E0        BLM,14        PUTHX
        0094  R  00CF
115     0095     EDF0        LDI,15        #3E3D
        0096  A  3E3D
116     0097     FEF1        STX,15,1                     STORE |>=| FOR OUTPUT
117     0098     601F        ABR,1,15
118     0099     6D75        TRR,7,5                      R7=VALUE
119     009A     E7E0        BLM,14        PUTHX
        009B  R  00CF
120     009C     EDF0        LDI,15        #0D0A
        009D  A  0D0A
121     009E     FEF1        STX,15,1
122     009F     601F        ABR,1,15
123     00A0     6CFF        ZRR,15
124     00A1     FEF1        STX,15,1                     TERMINATE MSG
125     00A2     E6F0        STM,15        E.IOF
        00A3  X  0003
126     00A4     E7E0        BLM,14        E:035          OUTPUT VALUE
        00A5  X  0002
127     00A6  R  012C        DEC           MSG2A
128     00A7     E700        BRU           E:SKD
        00A8  X  0006
129                    * GETHX RETRIVES HEX CHARS FROM INPUT BUFFER
130     00A9     EDD0  GETHX LDI,13        -4
        00AA  A  FFFC
131     00AB     FD51  GETH1 LDX,5,1                      GET NEXT CHAR
132     00AC     601F        ABR,1,15
133     00AD     E950        SUI,5         #30            CHECK DIGIT 0-9
        00AE  A  0030
134     00AF     7650        TBRB,5,0      HXERR          VAL<30
        00B0  R  00BD
135     00B1     E950        SUI,5         #A
        00B2  A  000A
136     00B3     7650        TBRB,5,0      GETH2
        00B4  R  00C5
137     00B5     E950        SUI,5         #7             CHECK DIGIT A-F
        00B6  A  0007
138     00B7     7650        TBRB,5,0      HXERR
```

```
        00B8  R  00BD
139     00B9     E950          SUI,5          #6
        00BA  A  0006
140     00BB     7650          TBRB,5,0       GETH3
        00BC  R  00C8
141     00BD     6C44  HXERR   ZRR,4
142     00BE     E640          STM,4          E.IOF          INVALID HEX DIGIT
        00BF  X  0003
143     00C0     E7E0          BLM,14         E:035
        00C1  X  0002
144     00C2  R  0154          DFC            MSG3
145     00C3     E700          BRU            E:SKD
        00C4  X  0006
146     00C5     E850  GETH2   ADI,5          #A             DIGIT 0-9
        00C6  A  000A
147     00C7     F703          HOP,$+3
148     00C8     E850  GETH3   ADI,5          #10            DIGIT A-F
        00C9  A  0010
149     00CA     2D5C          LLS,5,12
150     00CB     2C44          LLD,4,4                       MOVE DIGIT TO R4
151     00CC     70DF          ABRB,13,15     GETH1
        00CD  R  00AB
152     00CE     FF0E          BRX,14                        RETURN, R4=VAL
153                            * PUTHX STORES HEX VALUES IN OUTPUT BUFFER
154     00CF     EDD0  PUTHX   LDI,13         -2
        00D0  A  FFFE
155     00D1     6C66  PUTH1   ZRR,6
156     00D2     2C64          LLD,6,4
157     00D3     0926          MBL,2,6                       FIRST DIGIT
158     00D4     E960          SUI,6          #A
        00D5  A  000A
159     00D6     7660          TBRB,6,0       $+5
        00D7  R  00DB
160     00D8     E820          ADI,2          #3700          DIGIT A-F
        00D9  A  3700
161     00DA     F703          HOP,$+3
162     00DB     E820          ADI,2          #3000          DIGIT 0-9
        00DC  A  3000
163     00DD     6C66          ZRR,6
164     00DE     2C64          LLD,6,4
165     00DF     6826          ADR,2,6                       SECOND DIGIT
166     00E0     E960          SUI,6          #A
        00E1  A  000A
167     00E2     7660          TBRB,6,0       $+5
        00E3  R  00E7
168     00E4     E820          ADI,2          #37            DIGIT A-F
        00E5  A  0037
169     00E6     F703          HOP,$+3
170     00E7     E820          ADI,2          #30
        00E8  A  0030
```

```
171     00E9      FE21        STX,2,1
172     00EA      601F        ABR,1,15
173     00EB      70DF        ABRB,13,15     PUTH1
        00EC  R   00D1
174     00ED      FF0E        BRX,14                        RETURN
175                         * FORMAT ERROR MSG OUTPUT
176     00EE      6C44  FMTER ZRP,4
177     00EF      E640        STM,4          E.IOF
        00F0  X   0003
178     00F1      E7E0        BLM,14         E:035
        00F2  X   0002
179     00F3  R   015F        DFC            MSG4
180     00F4      E700        BRU            E:SKD
        00F5  X   0006
```

```
                        * THE TABLE OF VALID MESSAGES GIVES NECESSARY INFORMATION TO RESPOND
                        *   TO THE OPERATOR'S REQUEST.  THE FOLLOWING GIVES THE FORMAT OF THE
                        *   ENTRIES.
                        *  WORD 1..FIRST TWO CHARACTERS OF KEYWORD.
                        *  WORD 2..LAST TWO CHARACTERS OF KEYWORD.
                        *  WORD 3..BIT 0..SET FOR LOG MESSAGE
                        *          BIT 1..SET FOR TASK SCHEDULED
                        *          BIT 2..SET FOR BACKGROUND TASK
                        *          BIT 3-15..B.STT VLLUE FOR BACKGROUND TASK
                        *  WORD 4..ADDRESS OF TASK TO BE SCHEDULED IN E:SKD.
     00F6  A  4C4F  MSGTB DFC            |LOG:|,#8000,#0000
     00F7  A  473A
     00F8  A  8000
     00F9  A  0000
     00FA  A  4446        DFC            |DFC:|,#2001,E.T15
     00FB  A  433A
     00FC  A  2001
     00FD  X  0008
     00FE  A  4444        DFC            |DDD:|,#2002,E.T15
     00FF  A  443A
     0100  A  2002
     0101  X  0008
     0102  A  4444        DFC            |DDA:|,#2003,E.T15
     0103  A  413A
     0104  A  2003
     0105  X  0008
     0106  A  4F50        DFC            |OPC:|,#4000,E.T13
     0107  A  433A
     0108  A  4000
     0109  X  000C
     010A  A  5354        DFC            |STD:|,#4000,E.T08
     010B  A  443A
     010C  A  4000
     010D  X  0009
     010E  A  4352        DFC            |CRC:|,#4000,E.T04
     010F  A  433A
     0110  A  4000
     0111  X  000A
     0112  A  494E  MSG1  DFC            |INVALID KEYWORD, MSG. IGNORED|,#0D0A,0
     0113  A  5641
     0114  A  4C49
     0115  A  4420
     0116  A  4B45
     0117  A  5957
     0118  A  4F52
     0119  A  442C
     011A  A  204D
     011B  A  5347
     011C  A  2E20
     011D  A  4947
```

```
        011E  A  4E4F
        011F  A  5245
        0120  A  4420
        0121  A  0D0A
        0122  A  0000
200     0123  A  0020  SPACE DFC          #0020
201     0124  A  0D0A  MSG2  DFC          #0D0A,|123 123456 L: |
        0125  A  3132
        0126  A  3320
        0127  A  3132
        0128  A  3334
        0129  A  3536
        012A  A  204C
        012B  A  3A20
202     012C  A  0000  MSG2A RES          40,0          LOG MSG BUFFER
203     0154  A  494E  MSG3  DFC          |INVALID HEX DIGIT|,#0D0A,0
        0155  A  5641
        0156  A  4C49
        0157  A  4420
        0158  A  4845
        0159  A  5820
        015A  A  4449
        015B  A  4749
        015C  A  5420
        015D  A  0D0A
        015E  A  0000
204     015F  A  494E  MSG4  DFC          |INVALID FORMAT|,#0D0A,0
        0160  A  5641
        0161  A  4C49
        0162  A  4420
        0163  A  464F
        0164  A  524D
        0165  A  4154
        0166  A  0D0A
        0167  A  0000
205     0168                 END

TOTAL ASSEMBLY ERRORS =   0    SIZE =   360
```

```
 1                    PGM          E$T28
 2                     INT          E:I28,E:T28,E:O28,E.28F,E.280
 3                     EXT          E.T05,E.T07,E:SKD
 4                *    CAT NO.  400000-015
 5                * E$T28 IS THE ASR 28 HANDLER. THE PROGRAM CONSISTS
 6                *   OF THREE PARTS:
 7                *    E:I28 RESPONDS TO A DI FROM THE ASR 28
 8                *    E:T28 OUTPUTS BAUDOT CHARS TO THE ASR 28
 9                *    E:O28 TRANSLATES ASCII TO BAUDOT AND BUFFERS
10                *          THE OUTPUT FOR E:T28.
```

```
                    ************************************************************
                    * E:I28 RESPONDS TO THE DI (DATA INTERRUPT) GENERATED
                    *   BY THE COMPLETION OF EACH CHARACTER TRANSFER.
                    *   THIS ROUTINE SCHEDULES E:T28 IN E$SKD.
0000      8200      E:I28 OBMM,0        E.T05
0001  X   0001
0002      2500          CIR
```

```
                    ************************************************************
                    * E:T28 IS ENTERED AFTER THE TRANSFER OF A CHARACTER
                    *   HAS BEEN COMPLETED AND THE ASR 28 IS READY TO
                    *   ACCEPT ANOTHER.
                    * THEREFORE, THIS ROUTINE CHECKS TO SEE IF THE BUFFER
                    *   IS EMPTY.
                    *   IF NOT, THE POINTER SHOWS WHERE THE
                    *   NEXT CHARACTER COMES FROM, SO IT SENDS IT.
0003      ED20  E:T28 LDI,2        CHRBF          BYTE ADDRESSING SET UP.
0004  R   00E0
0005      E530        LDM,3        PNTOT          BYTE POINTER
0006  R   00DF
0007      8620        TBMB,2       T28IO,T281
0008  R   08E0
0009  R   0018
000A      603F        ABR,3,15                    MOVE POINTER TO NEXT BYTE (CHAR)
000B      7633        TBRB,3,3     $+3
000C  R   000E
000D      F702        HOP,$+2
000E      6C33        ZRR,3                       RECYCLE POINTER
000F      E630        STM,3        PNTOT          STORE UPDATED POINTER
0010  R   00DF
0011      6D43        TRR,4,3
0012      E140        SUM,4        PNTIN          CHECK FOR EMPTY BUFFER
0013  R   00DE
0014      7D44        TRRB,4,4     $+6                 ?
0015  R   001A
0016      E700        BRU          EMPTY
0017  R   0023
0018      8120  T281  ZBMM,2       T28IO
0019  R   08E0
001A      AE92        LBX,9,2                     GET CHAR FROM BUFFER
001B      A450        LFM,5        CONTR          GET CONTROL WORDS
001C  R   08E1
001D      4158        OCB,5,8
001E      4169        OCB,6,9
001F      4599        ODB,9,9                     OUTPUT CHAR (R9)
0020      4178        OCB,7,8
0021      E700        BRU          E:SKD          RETURN
0022  X   0003
0023      8100  EMPTY ZBMM,0       T28IO          CLEAR OUTPUT FLAG
0024  R   08E0
0025      8610        TBMB,1       T28IO,RESCH    RESCH REPORT?
0026  R   08E0
0027  R   002A
0028      E700        BRU          E:SKD           NO, RETURN
0029  X   0003
002A      8200  RESCH OBMM,0       E.T07          RESCHEDULE REPORT GENERATOR
002B  X   0002
002C      8110        ZBMM,1       T28IO          CLEAR RESCH BIT
```

```
        002D  R  08E0
52      002E     E700        BRU          E:SKD
        002F  X  0003
```

```
                        ****************************************************************
                        * E:028 IS THE WAY THE SYSTEM SETS UP OUTPUT MESSAGES
                        *   FOR THE ASR 28.  A PROGRAM CALLS THIS ROUTINE
                        *   TO HAVE A MESSAGE TRANSLATED FROM ASCII TO
                        *   BAUDOT AND THOSE CHARACTERS STUFFED AWAY IN
                        *   THE CHRBF.
                        * CALLING SEQUENCE:
                        *     BLM,14        E:028
                        *    (ADDRRSS OF FIRST CHAR. TO BE PRINTED)
                        * THE FIRST WORD FOLLOWING THE MESSAGE MUST BE #0000
                        * E.28F IS CHECKED AND SETS FLAGS IN T28IO ACCORDINGLY.
 0030     A510  E:028 SFM,1         SAVRS          RESERVE CONTENTS OF HONORABLE REGS.
 0031  R  08E5
 0032     FD2E        LDX,2,14                     GET START ADDRESS
 0033     60EF        ABR,14,15                    MOVE RETURN ADDR.
 0034     6C33        ZRF,3                        R3 INPUT BYTE POINTER
 0035     ED40        LDI,4         CHRBF          BASE OF CHARACTER BUFFER
 0036  R  00E0
 0037     EDA0        LDI,10        BAUDT
 0038  R  009E
 0039     E550        LDM,5         PNTIN          ENTRY POINTER
 003A  R  00DE
                        * SET UP FIRST CHAR TO BE |LTR MODE| SELECT
 003B     ED10        LDI,1         #1F            |LTR| CHARACTER
 003C  A  001F
 003D     E770        BLM,7         STORE          STORE CHARACTER
 003E  R  008C
 003F     8180        ZBMM,8        FLAG           SET FOR LTR MODE
 0040  R  08EC
 0041     AEB2  NXTWD LBX,11,2                     GET ASCII CHAR
 0042     603F        ABR,3,15                     MOVE POINTER
 0043     7DBB        TBRB,11,11    $+4            IS CHAR=0
 0044  R  0047
 0045     E700        BRU           FINI            YES, DONE
 0046  R  006D
 0047     AE1A        LBX,1,10                     TRANSLATE TO BAUDOT CHAR
 0048     E560        LDM,6         FLAG
 0049  R  08EC
 004A     6C61        XOR,6,1                      CHECK MODE VS. CUR. MODE
 004B     7668        TBRB,6,8      MDCHN          BIT 8 SET = > CHANGE MODE.
 004C  R  0052
 004D     6218  STRIT ZBR,1,8
 004E     E770        BLM,7         STORE          STORE BAUDOT CHAR
 004F  R  008C
 0050     E700        BRU           NXTWD
 0051  R  0041
                        * MDCHN CHANGES MODE
 0052     8680  MDCHN TBMB,8        FLAG,FTOL
 0053  R  08EC
 0054  R  0061
```

```
                        * CHANGE LTR TO FIG........
 0055     E610          STM,1        HOLD1
 0056  R  005E
 0057     ED10          LDI,1        #1B            |FIG| CHARACTER
 0058  A  001B
 0059     E770          BLM,7        STORE
 005A  R  008C
 005B     8280          OBMM,8       FLAG           SET BIT 8 FOR FIG.
 005C  R  08EC
 005D     ED10          LDI,1        0
 005E  A  0000
       R  005E  HOLD1 EQU            $-1
 005F     E700          BRU          STRIT
 0060  R  004D
                        * CHANGE FIG TO LTR
 0061     E610  FTOL    STM,1        HOLD2
 0062  R  006A
 0063     ED10          LDI,1        #1F            |LTR| CHARACTER
 0064  A  001F
 0065     E770          BLM,7        STORE
 0066  R  008C
 0067     8180          ZBMM,8       FLAG           RESET BIT 8 FOR LTR
 0068  R  08EC
 0069     ED10          LDI,1        0
 006A  A  0000
       R  006A  HOLD2 EQU            $-1
 006B     E700          BRU          STRIT
 006C  R  004D
                        ***************************************************************
                        * FINI WHEN BUFFER FULL, OR NO MORE DATA.
 006D     8600  FINI    TBMB,0       E.28F,$+4      DESIRE RESCHEDULE U.RP3?
 006E  R  08E4
 006F  R  0071
 0070     F703          HOP,$+3                       NO
 0071     8210          OBMM,1       T28IO            YES, FLAG T28IO
 0072  R  08E0
 0073     8600          TBMB,0       T28IO,RETRN    IS OUTPUT UNDERWAY?
 0074  R  08E0
 0075  R  0089
                        * NOTHING GOING ON WITH ASR 28, SO LET'S START SOMETHING
 0076     ED50          LDI,5        #4002
 0077  A  4002
 0078     4158          OCB,5,8
 0079     4919          ISR,1,9
 007A     7613          TBRB,1,3     $+4            NO POWER TO 28.
 007B  R  007E
 007C     E700          BRU          PERR
 007D  R  009B
 007E     8200          OBMM,0       T28IO          FLAG OUTPUT UNDERWAY
 007F  R  08E0
```

```
118     0080     8220        OBMM,2       T28IO
        0081  R  08E0
119     0082     A450        LFM,5        CONTR          GET CONTROL WORDS
        0083  R  08E1
120     0084     6C99        ZRR,9                       SEND NULL CHAR
121     0085     4158        OCB,5,8
122     0086     4169        OCB,6,9
123     0087     4599        ODB,9,9                     START OUTPUT
124     0088     4178        OCB,7,8
125     0089     A410  RETRN LFM,1        SAVRS          RESTORE REGISTERS
        008A  R  08E5
126     008B     FF0E        BRX,14                       AND RETURN
```

```
                    ********************************************************************
                    * STORE STORES BAUDOT CHAR IN CHRBF AND UPDATES
                    *   PNTIN....
     008C     AF14  STORE SBX,1,4                        STORE CHAR
     008D     605F        ABR,5,15                       MOVE POINTER TO NEXT LOCATION
     008E     7653        TBRB,5,3      $+3
     008F  R  0091
     0090     F702        HOP,$+2
     0091     6C55        ZRR,5
     0092     E650        STM,5         PNTIN
     0093  R  00DE
     0094     E560        LDM,6         PNTOT
     0095  R  00DF
     0096     7965        SURB,6,5      $+4
     0097  R  009A
     0098     F700        BRU           FINI            BUFFER FULL
     0099  R  006D
     009A     FF07        BRX,7                         RETURN
                    ********************************************************************
                    * POWER OFF ON ASR 28, SET OFF SONALERT
     009B     0100  PERR  RMI
     009C     E700        BRU           RETRN
     009D  R  0089
```

```
146                     ***********************************************************************
147                     * TABLE IS PACKED WITH 1 CHAR PER BYTE.  THE MSB
148                     *   OF A BYTE IS SET IF THE CHAR IS IN THE |FIGS|
149                     *   MODE.  THE BITS ARE STORED IN THE 5 LEAST
150                     *   SIGNIFICANT BITS OF THE BYTE, IN REVERSE ORDER.
151                     *   FOR EXAMPLE, THE LETTER |A| IS NORMALLY #18.
152                     *   IT IS STORED IN THE TABLE AS #03.
153     009E  A  0000   BAUDT DFC          #0000,#0000,#0000,#0000,#0000
        009F  A  0000
        00A0  A  0000
        00A1  A  0000
        00A2  A  0000
154     00A3  A  0200        DFC           #0200,#0008,#0000,#0000,#0000
        00A4  A  0008
        00A5  A  0000
        00A6  A  0000
        00A7  A  0000
155     00A8  A  0000        DFC           #0000,#0000,#0000,#0000,#1B00
        00A9  A  0000
        00AA  A  0000
        00AB  A  0000
        00AC  A  1B00
156     00AD  A  001F        DFC           #001F,#048D,#9194,#899D,#9A8B
        00AE  A  048D
        00AF  A  9194
        00B0  A  899D
        00B1  A  9A8B
157     00B2  A  8F92        DFC           #8F92,#8B9A,#8C83,#9C9D,#9697
        00B3  A  8B9A
        00B4  A  8C83
        00B5  A  9C9D
        00B6  A  9697
158     00B7  A  9381        DFC           #9381,#8A90,#9587,#8698,#8E9E
        00B8  A  8A90
        00B9  A  9587
        00BA  A  8698
        00BB  A  8E9E
159     00BC  A  8F8D        DFC           #8F8D,#9299,#0003,#190E,#0901
        00BD  A  9299
        00BE  A  0003
        00BF  A  190E
        00C0  A  0901
160     00C1  A  0D1A        DFC           #0D1A,#1406,#0B0F,#121C,#0C18
        00C2  A  1406
        00C3  A  0B0F
        00C4  A  121C
        00C5  A  0C18
161     00C6  A  1617        DFC           #1617,#0A05,#1007,#1E13,#1D15
        00C7  A  0A05
        00C8  A  1007
```

```
        00C9  A  1E13
        00CA  A  1D15
 162    00CB  A  118F        DFC          #118F,#8C92,#0083,#8C03,#190E
        00CC  A  8C92
        00CD  A  0083
        00CE  A  8C03
        00CF  A  190E
 163    00D0  A  0901        DFC          #0901,#0D1A,#1406,#0B0F,#121C
        00D1  A  0D1A
        00D2  A  1406
        00D3  A  0B0F
        00D4  A  121C
 164    00D5  A  0C18        DFC          #0C18,#1617,#0A05,#1007,#1E13
        00D6  A  1617
        00D7  A  0A05
        00D8  A  1007
        00D9  A  1E13
 165    00DA  A  1D15        DFC          #1D15,#118F,#8C92,#0085
        00DB  A  118F
        00DC  A  8C92
        00DD  A  0085
```

```
                    ***********************************************************************
                    * TWO POINTERS ARE USED TO ACCESS THE CHARACTER
                    *   BUFFER:
                    * PNTIN INDICATES THE NEXT LOCATION A CHAR MAY BE
                    *   ENTERED IN.
                    * PNTOT INDICATES THE NEXT LOCATION A CHAR WILL
                    *   BE TAKEN FROM FOR TRANSMISSION TO THE ASR 28.
                    * IF THEY POINT TO THE SAME LOCATION WHILE FILLING
                    *   THE BUFFER, IT IS FULL AND ADDITIONAL CHARACTERS
                    *   IN THAT MESSAGE WILL BE LOST.
                    * IF THEY POINT TO THE SAVE LOCATION WHILE DUMPING
                    *   THE BUFFER, IT IS EMPTY AND THE TRANSMISSION
                    *   IS TERMINATED.
                    * CHRBF IS A 4096 CHARACTER BUFFER.
                    *   FOR YOU WHO CAN'T DIVIDE BY 2, THAT'S A WHOPPING
                    *   2048 WORDS.  THIS THING HAS TO BE BIG ENOUGH FOR
                    *   SEVERAL OF THE MANY TABLES, ETC. THAT COULD BE
                    *   GENERATED AT ONE TIME.
00DE  A  0000       PNTIN DFC          0
00DF  A  0000       PNTOT DFC          0
00E0  A  0000       CHRBF RES          2048,0
                    ***********************************************************************
                    * T28IO IS A STATUS FLAG FOR THE ASR 28
                    * BIT 0=0 IDLE
                    *      =1 OUTPUT UNDERWAY
                    * BIT 1=0 NO REPORT MESSAGES WAITING
                    *      =1 REPORT MESSAGES WAITING
                    * BIT 2=0 NORMAL
                    *      =1 FIRST CHAR COMING UP
         R  08E0    E.280 EQU          $
08E0  A  0000       T28IO DFC          0
                    ***********************************************************************
                    * CONTR HAS THE CONTROL WORDS NECESSARY TO MAKE THE
                    *   ASR 28 OUTPUT
08E1  A  6002       CONTR DFC          #6002,#A020,#0200
08E2  A  A020
08E3  A  0200
                    ***********************************************************************
                    * E.28F IS A REQUEST FLAG FOR E$T28 ACTIONS.......
                    * BIT 0=0 THIS IS A |NORMAL| MESSAGE
                    *      =1 THIS INITIATES A REPORT SEQUENCE.
08E4  A  0000       E.28F DFC          0
                    ***********************************************************************
08E5                SAVRS RES          7              SAVE REGISTERS
                    ***********************************************************************
08EC  A  0000       FLAG DFC           0              SHOWS MODE
08ED                      END

TOTAL ASSEMBLY ERRORS =   0    SIZE =  2285
```

```
                         PGM         E$T35
                         INT         E:I35,E:T35,E:035,E.35I
                         INT         E.3IC,E.IOF,E:35S,E.35O
                         EXT         E.T12,E.T06,E.T15,E:SKD
                    *$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$
                    *HEP*HEP*HEP*HEP*HEP*HEP*HEP*HEP*HEP*HEP*HEP*HEP*HEP*HEP*HEP*HEP*HEP*
                    *$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$
                    *
                    * E$T35 IS THE ASR 35 TELETYPE SERVICE ROUTINE.  THIS INCLUDES SEVERAL
                    *   SUBROUTINES NECESSARY TO ALLOW OPERATOR I/O THROUGH THE SYSTEM...
                    *
                    *   E$I35 ENTERED VIA THE DATA INTERRUPT FROM THE ASR 35, SCHEDULES
                    *   E$T35 IN THE SYSTEM SCHEDULER.
                    *
                    *   E$T35 ENTERED AFTER EACH CHARACTER IS INPUT OR OUTPUT.  ON INPUT,
                    *   SOME BASIC TEXT ANALYSIS IS PERFORMED.  THE INPUT TERMINATION
                    *   (SIGNALED BY A C/R) CAUSES THE SYSTEM TO SCHEDULE EITHER THE
                    *   OPERATOR MESSAGE INTERPRETOR OR THE BACKGROUND PROCESSOR.  ON
                    *   OUTPUT THE NEXT CHARACTER IS SET UP UNTIL ALL OUTPUT IS COMPLETED
                    *
                    *   E$035 IS CALLED BY ANY PROGRAM DESIRING TO OUTPUT INFORMATION TO
                    *   THE ASR 35.  THE DATA IS MOVED TO THE OUTPUT BUFFER AND CONTROL
                    *   IS RETURNED TO THE CALLING PROGRAM.
                    *
                    *   THE ASR 35 WILL BE USED PRIMARILY FOR OPERATOR CUMMUNICATION WITH
                    *   THE SYSTEM AND THE ASR 28 USED FOR LOGGING INFORMATION OF AN
                    *   IMPORTANT NATURE.
                    *
0000       8200     E:I35 OBMM,0      E.T12          SET FLAG BIT FOR E:T35 IN E$SKD
0001   X   0001
0002       2500           CIR                        CLEAR INTERRUPT AND RETURN
                    *
0003       8600     E:T35 TBMB,0      T35IO,OUTPT    BRANCH IF OUTPUT UNDERWAY
0004   R   0122
0005   R   007C
0006       4C3A           IDA,3,#A                   READ CHARACTER
0007       6238           ZBR,3,8                    CLEAR PARITY BIT
0008       8610           TBMB,1      T35IO,GONG1    BRANCH IF PAST FIRST CHAR. NOW
0009   R   0122
000A   R   002D
000B       8620           TBMB,2      T35IO,RESPN
000C   R   0122
000D   R   0028
                    **
                    * CHECK FOR VALID FIRST CHARACTER OF OPERATOR INITIATED REQUEST
                    **
000E       E930           SUI,3       #2F            FIRST CHAR SHOULD BE |/|
000F   A   002F
0010       7033           TRRB,3,3    $+4              GOODY IT IS!!!!
0011   R   0014
```

```
42    0012      E700        BRU          VALID
      0013  R   001C
43    0014      6C33        ZRR,3
44    0015      E630        STM,3        E.IOF        ZERO E.IOF..........
      0016  R   0296
45    0017      E7E0        BLM,14       E:035        LOG INVALID INITIAL CHAR
      0018  R   00C8
46    0019  R   0123        DFC          FOUL1
47    001A      E700        BRU          E:SKD
      001B  X   0004
48    001C      6C22  VALID ZRR,2
49    001D      E620        STM,2        E.3IC        SET INPUT COUNTER TO 0
      001E  R   0183
50    001F      E620        STM,2        E.IOF        RESET E.IOF......
      0020  R   0296
51    0021      E7E0        BLM,14       E:035        SEND VALID INITIATE RESPONSE
      0022  R   00C8
52    0023  R   0130        DFC          GOOD1
53    0024      8210        OBMM,1       T35IO        SET FLAG FOR MSG. PAST FIRST CHAR
      0025  R   0122
54    0026      E700        BRU           E:SKD
      0027  X   0004
55    0028      8210  RESPN OBMM,1       T35IO        2ST CHAR OF RESPONSE ANYTHING GOES
      0029  R   0122
56    002A      6C22        ZRR,2
57    002B      E620        STM,2        E.3IC        RESET OUTPUT COUNTER
      002C  R   0183
58    002D      E540  GONG1 LDM,4        E.3IC        INPUT CHARACTER COUNTER
      002E  R   0183
59    002F      E634        STM,3,4      E.35I        STORE INPUT CHAR AWAY
      0030  R   0133
60    0031      ED50        LDI,5        #7F          IS CHAR RUB OUT (#10) ?
      0032  A   007F
61    0033      7953        SURB,5,3     $+4          BRU IF CHAR IS INDEED A RUB OUT
      0034  R   0037
62    0035      E700        BRU          RUBCT
      0036  R   0073
63    0037      ED50        LDI,5        #18          IS CHAR CANCEL (#18)
      0038  A   0018
64    0039      7953        SURB,5,3     $+4          BRU IF CHAR IS INDEED A CANCEL
      003A  R   003D
65    003B      E700        BRU          CANCL
      003C  R   0069
66    003D      ED50        LDI,5        #0D          IS CHAR C/R (#0D) ?
      003E  A   000D
67    003F      7953        SURB,5,3     $+4          BRU IF CHAR IS INDEED A C/R
      0040  R   0043
68    0041      E700        BRU          DONE
      0042  R   004A
69    0043      604F        ABR,4,15                  MOVE POINTER/COUNTER
```

```
70    0044     E640        STM,4        E.3IC
      0045 R   0183
71    0046     E940        SUI,4        80
      0047 A   0050
72    0048     7D44        TRRB,4,4     E:SKD        RETURN AND AWAIT NEXT CHARACTER
      0049 X   0004
73    004A     6C33  DONE  ZRR,3
74    004B     E630        STM,3        E.IOF        RESET E.IOF......
      004C R   0296
75    004D     E7E0        BLM,14       E:035        OUTPUT CR/LF TO ASR 35
      004E R   00C8
76    004F R   0184        DFC          CRLF
77    0050     E540        LDM,4        E.3IC
      0051 R   0183
78    0052     E634        STM,3,4      E.35I        STORE MSG TERMINATOR
      0053 R   0133
79    0054     8110        ZBMM,1       T35IO        CLEAR MSG. UNDERWAY FLAG BIT
      0055 R   0122
80    0056     8620        TBMB,2       T35IO,RSPNS  IS MSG. REQUEST OR RESPONSE
      0057 R   0122
      0058 R   005C
81    0059     8200        OBMM,0       E.T06        .....REQUEST, SO SCHED. E:OMI
      005A X   0002
82    005B     F705        HOP,$+5
83    005C     8120  RSPNS ZBMM,2       T35IO        RESET REQUEST/RESPONSE FLAG BIT
      005D R   0122
84    005E     8200        OBMM,0       E.T15        AND SCHEDULE BACKGROUND SYSTEM
      005F X   0003
85    0060     8630        TBMB,3       T35IO,$+5    IS OUTPUT WAITING? BRU IF IT IS.
      0061 R   0122
      0062 R   0065
86    0063     E700        BRU          E:SKD        NO, RETURN TO SYSTEM
      0064 X   0004
87    0065     E770        BLM,7        TOTST        BEGIN TTY OUTPUT
      0066 R   0102
88    0067     E700        BRU          E:SKD        AND THEN RETURN TO SYSTEM
      0068 X   0004
89    0069     8110  CANCL ZBMM,1       T35IO        CANCEL MSG, RESET MSG UNDERWAY FLAG
      006A R   0122
90    006B     6C22        ZRR,2
91    006C     E620        STM,2        E.IOF        CLEAR E.IOF...
      006D R   0296
92    006E     E7E0        BLM,14       E:035        SEND CR,LF TO ASR 35
      006F R   00C8
93    0070 R   0184        DFC          CRLF
94    0071     E700        BRU          E:SKD
      0072 X   0004
95    0073     7D44  RUBCT TRRB,4,4     $+4
      0074 R   0077
96    0075     E700        BRU          CANCL        RUB OUT FIRST CHAR SAVE AS CANCEL
```

```
        0076  R  0069
 97     0077     614F        SBR,4,15                      BACKSPACE POINTER COUNTER ONE
 98     0078     E640        STM,4          E.3IC
        0079  R  0183
 99     007A     E700        BRU            E:SKD
        007B  X  0004
100     007C     8660  OUTPT TBMB,6         T35IO,OUT01   NEED SECOND NULL?
        007D  R  0122
        007E  R  0084
101     007F     8670        TBMB,7         T35IO,OUT02
        0080  R  0122
        0081  R  008D
102     0082     E700        BRU            NOUT
        0083  R  009A
103     0084     8160  OUT01 ZBMM,6         T35IO         RESET TO NORMAL MODE
        0085  R  0122
104     0086     6C33        ZRR,3
105     0087     ED40        LDI,4          #A000
        0088  A  A000
106     0089     404A        OCA,4,#A                     CONTROL TO 35
107     008A     443A        ODA,3,#A                     OUTPUT NULL CHARACTER
108     008B     E700        BRU            E:SKD
        008C  X  0004
109                    *
110     008D     ED20  OUT02 LDI,2          OUTBF         SET TO GET CHAR WITH BYTE ADDRESS.
        008E  R  0186
111     008F     E530        LDM,3          PNTOT         BYTE POINTER
        0090  R  0287
112     0091     AE82        LBX,8,2                      GET CHARACTER
113     0092     ED40        LDI,4          #A000
        0093  A  A000
114     0094     404A        OCA,4,#A
115     0095     448A        ODA,8,#A                     OUTPUT CHARACTER
116     0096     8170        ZBMM,7         T35IO         CLEAR FIRST CHARACTER FLAG
        0097  R  0122
117     0098     E700        BRU            E:SKD
        0099  X  0004
118                    *
119     009A     ED20  NOUT  LDI,2          OUTBF         SET UP FOR BYTE ADDRESSING
        009B  R  0186
120     009C     E530        LDM,3          PNTOT
        009D  R  0287
121     009E     603F        ABR,3,15                     MOVE POINTER TO NEXT BYTE
122     009F     7636        TBRB,3,6       $+3
        00A0  R  00A2
123     00A1     F702        HOP,$+2
124     00A2     6C33        ZRR,3                        RECYCLE BUFFER TO TOP
125     00A3     E630        STM,3          PNTOT         STORE UPDATED OUTPUT POINTER
        00A4  R  0287
126     00A5     6D43        TRR,4,3
```

```
00A6      E140        SUM,4          PNTIN          BUFFER EMPTY IF PNTOT = PNTIN
00A7  R   0286
00A8      7D44        TRRB,4,4       $+4            BRU IF BUFFER IS EMPTY
00A9  R   00AC
00AA      E700        BRU            EMPTY
00AB  R   00B3
00AC      AE82        LBX,8,2                       GET CHAR FROM MEMORY INTO R8
00AD      ED40        LDI,4          #A000          INITIALIZE OUTPUT OF NEXT CHAR
00AE  A   A000
00AF      404A        OCA,4,#A
00B0      448A        ODA,8,#A
00B1      E700        BRU            E:SKD          RETURN TO SENDER
00B2  X   0004
00B3      ED20  EMPTY LDI,2          #9800
00B4  A   9800
00B5      C120        ETMM,2         T35IO          RESET FLAG BITS 0, 3, 4
00B6  R   0122
00B7      8650        TBMB,5         T35IO,$+5
00B8  R   0122
00B9  R   00BC
00BA      E700        BRU            EMTY1
00BB  R   00C0
00BC      8200        OBMM,0         E.T15          SCHEDULE BACKGROUND SYSTEM
00BD  X   0003
00BE      8150        ZBMM,5         T35IO          CLEAR RESCHEDULE FLAG BIT
00BF  R   0122
00C0      ED40  EMTY1 LDI,4          #4400
00C1  A   4400
00C2      404A        OCA,4,#A                      RESET INTERRUPT FOR INPUT CHARS
00C3      ED40        LDI,4          #AC00
00C4  A   AC00
00C5      404A        OCA,4,#A
00C6      E700        BRU            E:SKD          RETURN TO SENDER
00C7  X   0004
```

```
                        *
                        * E:035 IS THE MEANS FOR SYSTEM AND APPLICATION PROGRAMS TO OUTPUT
                        *   INFORMATION TO THE ASR 35 TELETYPEWRITER.
                        *   CALLING SEQUENCE IS.......
                        *
                        *     BLM,14        E:035
                        *     ( ADDR OF FIRST WORD OF STUFF TO BE PRINTED ON ASR 35 )
                        *
                        * WHERE THE FIRST WORD AFTER THE MESSAGE IS #0000 TO TERMINATE OUTPUT
                        *
00C8      A510  E:035 SFM,1         SAVRS          SAVE REGISTERS
00C9  R   0288
00CA      FD2E        LDX,2,14                     GET START ADDRESS
00CB      60EF        ABR,14,15                    MOVE RETURN ADDRESS AROUND PARAM.
00CC      E550        LDM,5         PNTIN          GET INPUT BUFFER POINTER
00CD  R   0286
00CE      2951        RLS,5,1                      CONVERT COUNTER FROM BYTES TO WORDS
00CF      FD32  NXTWD LDX,3,2                      GET NEXT WOTPUT WORD (2 CHARS.)
00D0      7D33        TRRB,3,3      $+4            DONE IF WORD IS #0000
00D1  R   00D4
00D2      E700        BRU           FINI
00D3  R   00E7
00D4      E635        STM,3,5       OUTBF          STORE IN OUTPUT BUFFER
00D5  R   0186
00D6      80E0        ABMM,14       PNTIN          MOVE POINTER TWO BYTES IN MEMORY
00D7  R   0286
00D8      605F        ABR,5,15                     MOVE POINGER ONE WORD IN R5
00D9      8660        TBMB,6        PNTIN,$+5      IS POINTER OVER TOP OF BUFFER
00DA  R   0286
00DB  R   00DE
00DC      E700        BRU           $+5
00DD  R   00E1
00DE      6C55        ZRR,5                        YES, RESET TO TOP
00DF      E650        STM,5         PNTIN          IN MEMORY, AND R5
00E0  R   0286
00E1      602F        ABR,2,15                     MOVE NEXT WORD POINTER
00E2      E540        LDM,4         PNTOT          GET OUTPUT POINTER
00E3  R   0287
00E4      2941        RLS,4,1
00E5      7945        SURB,4,5      NXTWD
00E6  R   00CF
00E7      8610  FINI  TBMB,1        E.IOF,$+4      LAST OUTPUT WORD MOVED TO BUFFER
00E8  R   0296
00E9  R   00EB
00EA      F703        HOP,$+3
00EB      8220        OBMM,2        T35IO          NEXT INPUT WILL BE OPERATOR RESPONSE
00EC  R   0122
00ED      8600        TBMB,0        E.IOF,$+4
00EE  R   0296
00EF  R   00F1
```

```
180   00F0     F703        HOP,$+3
181   00F1     8250        OBMM,5        T35IO          RESCHEDULE BACKGROUND AFTER OUTPUT
      00F2  R  0122
182   00F3     8610        TBMB,1        T35IO,UNDER    IS INPUT UNDERWAY INHIBITING OUTPUT
      00F4  R  0122
      00F5  R  00FE
183   00F6     8600        TBMB,0        T35IO,RETRN    IF OUTPUT IS UNDERWAY, NEW STUFF RDY
      00F7  R  0122
      00F8  R  00FB
184   00F9     E770        BLM,7         TOTST
      00FA  R  0102
185   00FB     A410  RETRN LFM,1         SAVRS          RESTORE REGISTERS
      00FC  R  0288
186   00FD     FF0E        BRX,14                       RETURN
187   00FE     8230  UNDER OBMM,3        T35IO          SET OUTPUT WAIT
      00FF  R  0122
188   0100     E700        BRU           RETRN          AND RETURN
      0101  R  00FB
189                    ******************************************************************
190                    ***  TOTST TAKES CARE OF STARTING OUTPUT.......................***
191                    ******************************************************************
192   0102     8200  TOTST OBMM,0        T35IO          SET FLAG TO SHOW OUTPUT
      0103  R  0122
193   0104     8240        OBMM,4        T35IO          SET FLAG TO SHOW OUTPUT UNDERWAY
      0105  R  0122
194   0106     8130        ZBMM,3        T35IO          CLEAR OUTPUT WAITING FLAG BIT
      0107  R  0122
195   0108     ED20        LDI,2         #5000          ENABLE SI
      0109  A  5000
196   010A     402A        OCA,2,#A
197   010B     ED20        LDI,2         #4400          TERMINATE
      010C  A  4400
198   010D     402A        OCA,2,#A
199   010E     FF07        BRX,7                        RETURN, WAIT FOR SI
200                    ******************************************************************
201                    *
202                    * AFTER THE TERMINATE IS COMPLETED, AN SI IS
203                    *   GENERATED WHICH VECTORS ENTRY TO E:35S.
204                    *
205                    ******************************************************************
206   010F     A510  E:35S SFM,1         E35SV          SAVE REGISTERS
      0110  R  028F
207   0111     483A        ISA,3,#A                     READ 35 STATUS
208   0112     7637        TBRB,3,7      PERR           NO POWER TO ASR 35
      0113  R  0120
209   0114     ED20        LDI,#2        #A000
      0115  A  A000
210   0116     6C33        ZRR,3
211   0117     402A        OCA,2,#A                     XFER INIT.
212   0118     443A        ODA,3,#A                     OUTPUT NULL CHARACTER
```

```
213     0119      8260        OBMM,6        T35IO          SET FOR ANOTHER NULL
        011A  R   0122
214     011B      8270        OBMM,7        T35IO          FLAG FIRST CHAR. OUTPUT
        011C  R   0122
215     011D      A410        LFM,1         F35SV          RESTORE REGISTERS
        011E  R   028F
216     011F      2500        CIP
217                       ******************************************************************
218                       *
219                       * A POWER LOSS HAS BEEN DETECTED TO THE ASR 35.
220                       *   FOR LACK OF ANYTHING BETTER TO DO, SET OFF
221                       *   A SONALERT.
222                       *
223     0120      0100  PERR  RMI
224     0121      2500        CIP
225                       *
```

```
                        * T35IO IS THE WORD USED TO FLAG VARIOUS ACTIVITIES AND CONDITIONS FOR
                        *   OPERATIONS ON THE ASR 35.  THE BITS ARE INTERPRETED AS FOLLOWS.
                        *
                        * BIT 0=0 INPUT EXPECTED
                        *      =1 OUTPUT UNDERWAY
                        *
                        *     1=0 FIRST CHAR. OF INPUT MESSAGE
                        *      =1 INPUT PAST FIRST CHARACTER
                        *
                        *     2=0 INPUT IS OPERATOR INITIATED REQUEST TO SYSTEM
                        *      =1 INPUT IS OPERATOR RESPONSE TO SYSTEM INQUIRY
                        *
                        *     3=0 NO OUTPUT SCHEDULED DURING INPUT
                        *      =1 OUTPUT SCHEDULED DURING INPUT OPERATION
                        *
                        *     4=0 ASR 35 NOT BUSY WITH OUTPUT
                        *      =1 ASR 35 OUTPUT UNDERWAY
                        *
                        *     5=0 NO BACKGROUND RESCHEDULED AFTER OUTPUT
                        *      =1 RESCHEDULE BACKGROUND SYSTEM AFTER OUTPUT COMPLETED
                        *
                        *     6=0 NORMAL OUTPUT MODE
                        *      =1 NEED ANOTHER NULL OUTPUT
                        *
                        *     7=0 NORMAL RUN
                        *      =1 OUTPUT FIRST CHARACTER
                        *
            R  0122     E.350 EQU          $
     0122   A  0000     T35IC DFC          0
     0123   A  0D0A     FOUL1 DFC          #0D0A,|INVALID SYSTEM CALL |,#0D0A,0
     0124   A  494E
     0125   A  5641
     0126   A  4C49
     0127   A  4420
     0128   A  5359
     0129   A  5354
     012A   A  454D
     012B   A  2043
     012C   A  414C
     012D   A  4C20
     012E   A  0D0A
     012F   A  0000
     0130   A  0D5C     GOOD1 DFC          #0D5C,#2020,#0000
     0131   A  2020
     0132   A  0000
     0133   A  0000     E.35I RES          80,0          INPUT BUFFER
     0183   A  0000     E.3IC DFC          0             INPUT CHAR. COUNTER
     0184   A  0D0A     CRLF  DFC          #0D0A,0
     0185   A  0000
                        *
```

```
262                 *
```

```
                    * OUTBF IS THE OUTPUT BUFFER, PACKED AT TWO CHARS PER WORD. BYTE
                    *   ADDRESSING IS USED TO RETRIEVE THE OUTPUT CHARACTERS IN TURN.
                    *   PNTIN IS THE BUFFER POINTER USED TO STORE DATA IN THE BUFFER.
                    *   PNTOT IS THE BUFFER POINTER USED TO REMOVE DATA FROM THE BUFFER.
                    *   BFLIM IS THE LIMIT FOR THE BUFFER POINTERS BEFORE RECYCLING.
                    *
0186                OUTBF RES          256          512 CHARACTER OUTPUT BUFFER (#100)
0286  A  0000       PNTIN DFC          0
0287  A  0000       PNTOT DFC          0
0288                SAVRS RES          7
028F                E35SV RES          7
                    *
                    *
```

```
 278                    * E.IOF TRANSMITS DATA ABOUT CALL FROM B:IOR TO E:035.
 279                    *   BIT 0=0 DO NOT RESCHEDULE BACKGROUND AFTER I/O DONE
 280                    *        =1 RESCHEDULE BACKGROUND AFTER I/O DONE
 281                    *       1=0 NO RESPONSE EXPECTED
 282                    *        =1 OPERATOR RESPONSE IS EXPECTED
 283                    *
 284     0296  A  0000  E.IOF DFC          0
 285     0297                 END

TOTAL ASSEMBLY ERRORS =   0    SIZE =   663
```

```
 1                    PGM          E$MAG
 2                     INT          E:MAG,E:MTI,E:MGS
 3                     EXT          E:SKD,E.T15,E.IOF,E:035,B.STT
 4                     EXT          E.T11,F.MTP
 5                *    CAT.NO.400000-018
 6                * E$MAG IS THE MAGNETIC TAPE UNIT CONTROL PROGRAM.
 7                *  IT CONSISTS OF THREE PARTS:
 8                *   1. E:MGS IS CALLED BY A BACKGROUND ROUTINE
 9                *      VIA THE B:IOR TO INIATE A DATA TRANSFER.
10                *   2. E:MTI RESPONDS TO THE SI FOLLOWING THE
11                *      COMPLETION OF THE DATA TRANSFER AND SCHEDULES
12                *      E:MAG IN THE SYSTEM SCHEDULER.
13                *   3. E:MAG CHECKS FOR ERRORS IN THE DATA TRANSFER
14                *      AND INFORMS THE OPERATOR OF THEM.  IF ALL
15                *      WENT WELL, THE BACKGROUND PROCESSOR IS
16                *      RESCHEDULES.
```

```
                    ****************************************************************
                    * A MAG TAPE SI CAUSES ENTRY TO E:MTI
     0000     8200  E:MTI OBMM,0        E.T11          SCHEDULE E:MAG
     0001  X  0006
     0002     2500        CIR
```

```
                        ****************************************************************
                        * AFTER EACH MAG TAPE SI, E:MAG IS ENTERED FROM THE
                        *    SCHEDULER.
                        * E:MAG CHECKS THE STATUS OF THE MAG TAPE UNIT AND
                        *    LOGS ANY ERRORS FOR THE OPERATOR.
0003        4814  E:MAG ISA,1,4                          READ MT STATUS
0004        7610        TBRB,1,0       NOERR
0005   R    0031
                        * WE HAVE A MAG TAPE ERROR, PINPOINT THE CUASE*
0006        7612        TBRB,1,2       PARER             PARITY ERROR
0007   R    0010
0008        7616  MAG01 TBRB,1,6       DEFER             TAPE DEFECT
0009   R    0015
000A        7619        TBRB,1,9       EOTER             EOT FOUND
000B   R    0018
000C        7613        TBRB,1,3       INOPE             INOPERATIVE
000D   R    001B
000E        E700        BRU            NOERR
000F   R    0031
0010        7602  PARER TBRB,0,2       MAG01
0011   R    0008
0012        ED10        LDI,1          M02
0013   R    0078
0014        F709       HOP,EROUT
0015        ED10  DEFER LDI,1          M03
0016   R    0086
0017        F706        HOP,EROUT
0018        ED10  EOTER LDI,1          M04
0019   R    0093
001A        F703        HOP,EROUT
001B        ED10  INOPE LDI,1          M05
001C   R    00A0
001D        6C22  EROUT ZRR,2
001E        E620        STM,2          E.IOF
001F   X    0003
0020        E610        STM,1          $+4
0021   R    0024
0022        E7E0        BLM,14         E:035
0023   X    0004
0024   A    0000        DFC            0
0025        E7E0        BLM,14         E:035
0026   X    0004
0027   R    00AE        DFC            M06
0028        6C22        ZRR,2
0029        E620        STM,2          B.STT             ABORT BACKGROUND
002A   X    0005
002B        ED10        LDI,1          14080
002C   A    3700
002D        E610        STM,1          F.MTP
002E   X    0007
```

```
 55     002F      E700        BRU          E:SKD
        0030  X   0001
 56                     * LAST MAG TAPE READ WAS GOOD, RESCHEDULE BACKGROUND.
 57     0031      8200  NOERR OBMM,0       E.T15
        0032  X   0002
 58     0033      E700        BRU          E:SKD
        0034  X   0001
```

```
60                      ***************************************************************
61                      * E:MGS IS CALLED BY THE BACKGROUND SYSTEM TO BEGIN
62                      *   A MAG TAPE I/O TRANSFER.
63                      * CALLING SEQUENCE:
64                      *     BLM,13          E:MGS
65                      *     (PARAMETER WORD)
66                      *     (MEMORY START ADDRESS)
67                      *     (WORD COUNT)
68    0035      A510    E:MGS SFM,1           TEMP
      0036  R   00BB
69    0037      FD2D          LDX,2,13
70    0038      E620          STM,2           #74              STORE TA
      0039  A   0074
71    003A      60DF          ABR,13,15
72    003B      FD2D          LDX,2,13
73    003C      6F22          TTR,2,2
74    003D      E620          STM,2           #64              STORE TC
      003E  A   0064
75    003F      60DF          ABR,13,15                        MOD RETURN ADDRESS
76    0040      4814          ISA,1,4
77    0041      7613          TBRB,1,3        ABRT             BRU IF MT NOT RDY
      0042  R   0051
78    0043      761C          TBRB,1,12       ABRT             BRU IF MT OFFLINE
      0044  R   0051
79    0045      EC10          XOI,1           #C4F0            POWER OFF STATUS
      0046  A   C4F0
80    0047      7D11          TRRB,1,1        $+4
      0048  R   004B
81    0049      E700          BRU             ABRT             POWER IS OFF
      004A  R   0051
82    004B      ED10          LDI,1           #DCC0
      004C  A   DCC0
83    004D      4014          OCA,1,4                          INIATE DMP READ.....
84    004E      A410    MGSRT LFM,1           TEMP
      004F  R   00BB
85    0050      FF0D          BRX,13
86    0051      6C11    ABRT  ZRR,1
87    0052      E610          STM,1           E.IOF
      0053  X   0003
88    0054      E7E0          BLM,14          E:035
      0055  X   0004
89    0056  R   0060          DFC             M01
90    0057      6C11          ZRR,1
91    0058      E610          STM,1           B.STT
      0059  X   0005
92    005A      ED10          LDI,1           14080
      005B  A   3700
93    005C      E610          STM,1           F.MTP
      005D  X   0007
94    005E      E700          BRU             MGSRT
```

```
005F  R  004E
```

```
 96                          ****************************************************************
 97     0060  A  0D0A  M01   DFC          #0D0A,|MAG TAPE NOT READY, |
        0061  A  4D41
        0062  A  4720
        0063  A  5441
        0064  A  5045
        0065  A  204E
        0066  A  4F54
        0067  A  2052
        0068  A  4541
        0069  A  4459
        006A  A  2C20
 98     006B  A  4341        DFC          |CALLING TASK ABORTED. |,#0D0A
        006C  A  4C4C
        006D  A  494E
        006E  A  4720
        006F  A  5441
        0070  A  534B
        0071  A  2041
        0072  A  424F
        0073  A  5254
        0074  A  4544
        0075  A  2E20
        0076  A  0D0A
 99     0077  A  0000        DFC          0
100     0078  A  0D0A  M02   DFC          #0D0A,|MAG TAPE PARITY ERROR,  |
        0079  A  4D41
        007A  A  4720
        007B  A  5441
        007C  A  5045
        007D  A  2050
        007E  A  4152
        007F  A  4954
        0080  A  5920
        0081  A  4552
        0082  A  524F
        0083  A  522C
        0084  A  2020
101     0085  A  0000        DFC          0
102     0086  A  0D0A  M03   DFC          #0D0A,|TAPE DEFECT DETECTED, |
        0087  A  5441
        0088  A  5045
        0089  A  2044
        008A  A  4546
        008B  A  4543
        008C  A  5420
        008D  A  4445
        008E  A  5445
        008F  A  4354
        0090  A  4544
```

```
        0091  A  2C20
103     0092  A  0000          DFC        0
104     0093  A  0D0A   M04    DFC        #0D0A,|END OF TAPE DETECTED, |
        0094  A  454E
        0095  A  4420
        0096  A  4F46
        0097  A  2054
        0098  A  4150
        0099  A  4520
        009A  A  4445
        009B  A  5445
        009C  A  4354
        009D  A  4544
        009E  A  2C20
105     009F  A  0000          DFC        0
106     00A0  A  0D0A   M05    DFC        #0D0A,|TAPE UNIT INOPERATIVE,  |
        00A1  A  5441
        00A2  A  5045
        00A3  A  2055
        00A4  A  4E49
        00A5  A  5420
        00A6  A  494E
        00A7  A  4F50
        00A8  A  4552
        00A9  A  4154
        00AA  A  4956
        00AB  A  452C
        00AC  A  2020
107     00AD  A  0000          DFC        0
108     00AE  A  4341   M06    DFC        |CALLING TASK ABORTED. |,#0D0A,0
        00AF  A  4C4C
        00B0  A  494E
        00B1  A  4720
        00B2  A  5441
        00B3  A  534B
        00B4  A  2041
        00B5  A  424F
        00B6  A  5254
        00B7  A  4544
        00B8  A  2E20
        00B9  A  0D0A
        00BA  A  0000
109     00BB  A  0000   TEMP   RES        7,0
110     00C2                   END

TOTAL ASSEMBLY ERRORS =   0    SIZE =   194
```

```
 1                    PGM          U$RTA
 2                     INT          U:RTA,U:CNI,U.SIG,U.TM3,U.TM4
 3                     EXT          U.CYC,U.WRK,U.RTY,U.IHB,U.AST
 4                     EXT          U.FAC,U.CCN,U.LST,U.LSP,E:DIF
 5                     EXT          E:SRT,U.LTF,U.DIU,E:MIT,U.BLL
 6                     EXT          U.TRK,U:LSQ,U.CPC,U.CMP,U.CTM
 7                     EXT          U.TRF,E:035,E.TM1,E.TM2,E:FCT
 8                     EXT          U.CST,E:LOG,U.GAN,U.AMP,E:FMF
 9                     EXT          U.CPP,E.IOF,M.STA
10                *    CAT NO.  400100-002
11                *U$RTA PERFORMS THE FOLLOWING FUNCTIONS
12                *   1. MONITORS CHANNEL AMPLITUDE TO DETERMINE NEED FOR GAIN CHANGES.
13                *   2. MONITORS CHANNEL PHASE TO DETERMINE NEED FOR TRACKING RATE CHANGE
14                *   3. MONITORS PERCENT BLANKED SIGNAL TO DETERMINE NEEDED LEVEL CHANGES
15                *   4. CONTROLS CHANNEL R.F. GAIN AND LOGS CHANGES
16                *   5. CONTROLS CHANNEL BLANKING LEVEL AND LOGS CHANGES
17                *   6. COMPUTES STANDARD DEVIATION OF INPUT PHASE SIGNAL
18                *   7. CONTROLS CHANNEL TRACK RATE BASED ON STD DEV AND LOGS CHANGES
19                *   8. PERFORMS DATA COMPRESSION
20                *   9. CONTROLS CHANNEL DOWN SEQUENCE.
21                * (BUSY LITTLE BASTARD ISN'T IT?????)
```

```
                    ******************************************************************
                    * AMPLITUDE MONITORING SECTION....
0000      6C66  U:RTA ZRR,6                          R6 CHANNEL POINTER (C)
0001      EDD0  RTA1  LDI,13        44               R13 SAMPLE POINTER (S)
0002  A   002C
0003      6C55        ZRR,5
0004      E650        STM,5         MUBAV            RESET BAD AVERAGE FLAG
0005  R   0314
0006      E650        STM,5         SATTY            RESET SATURATION TALLY
0007  R   0312
0008      E650        STM,5         DRPTY            RESET DROP TALLY
0009  R   0313
000A      ED30  RTA2  LDI,3         #3
000B  A   0003
000C      2036        MPR,3,6
000D      6D23        TRR,2,3
000E      682D        ADR,2,13                       INDEX = S + C. (R2)
000F      E532        LDM,3,2       U.WRK            GET AMPLITUDE VALUE INTO R3
0010  X   0002
0011      E130        SUM,3         AMPMN
0012  R   02F2
0013      7630        TBRB,3,0      LOVAL            GO TALLY VAL IF ITS LESS THAN AMPMN
0014  R   002C
0015      E130        SUM,3         AMPMX
0016  R   02F3
0017      7630        TBRB,3,0      NXTSM            CHECK NEXT SAMPLE IF POINT IS O.K.
0018  R   004A
0019      80F6        ABMM,15,6     HIVTY            TALLY HI AMP VALUE ON THIS CHAN
001A  R   0304
001B      E130        SUM,3         SATUR
001C  R   02F5
001D      7630        TBRB,3,0      NXTSM            GO ON IF POINT NOT SATURATED
001E  R   004A
001F      80F0        ABMM,15       SATTY            TALLY SATURATED AMP VALUE
0020  R   0312
0021      E530        LDM,3         SATTY              ?
0022  R   0312
0023      E930        SUI,3         #6               IS SATURATION TALLY FULL?
0024  A   0006
0025      7D33        TRRB,3,3      NXTSM
0026  R   004A
0027      653F        LBR,3,15
0028      E630        STM,3         MUBAV            SET MUBAV=+1 TO FLAG SATURATED CHAN
0029  R   0314
002A      E700        BRU           NXTSM            GO TO NEXT SAMPLE
002B  R   004A
002C      80F6  LOVAL ABMM,15,6     LOVTY            TALLY LO AMP VALUE ON THIS CHAN
002D  R   02F6
002E      E030        ADM,3         AMPDP
002F  R   02F4
```

```
52    0030      7630        TBRB,3,0      $+4
      0031  R   0034
53    0032      E700        BRU           NXTSM        NOT DROP VALUE, CHECK NEXT SAMPLE
      0033  R   004A
54    0034      80F0        ABMM,15       DRPTY        TALLY SIGNAL DROP-OUT VALUE
      0035  R   0313
55    0036      E530        LDM,3         DRPTY
      0037  R   0313
56    0038      F930        SUI,3         #3           IS DROP TALLY FULL
      0039  A   0003
57    003A      7D33        TRRB,3,3      $+7
      003B  R   0041
58    003C      673F        GMR,3,15
59    003D      F630        STM,3         MUBAV        SET MUBAV=-1 TO FLAG SIGNAL LOST
      003E  R   0314
60    003F      E700        BRU           NXTSM
      0040  R   004A
61    0041      6D32        TRR,3,2                    SUBSTITUTE PREVIOUS PHASE VALUE FOR
62    0042      603F        ABR,3,15                    CURRENT
63    0043      6D43        TRR,4,3
64    0044      E940        SUI,4         44
      0045  A   002C
65    0046      E554        LDM,5,4       U.WRK        GET PREVIOUS PHASE VALUE
      0047  X   0002
66    0048      E653        STM,5,3       U.WRK        STORE FOR CURRENT ONE
      0049  X   0002
67    004A      F8D0  NXTSM ADI,13        44           MOVE POINTER TO NEXT ROW (NEXT SAMP)~
      004B  A   002C
68    004C      ED30        LDI,3         484
      004D  A   01E4
69    004E      793D        SURB,3,13     RTA2
      004F  R   000A
70    0050      E532        LDM,3,2       U.WRK        RETAIN CURRENT AMP VALUE
      0051  X   0002
71    0052      E636        STM,3,6       U.AMP
      0053  X   001D
```

```
                        ******************************************************************
                        * PHASE MONITOR SECTION......
0054      E530          LDM,3          MUBAV
0055  R   0314
0056      7D33          TRRB,3,3       DNSEQ          IF MUBAV IS NOT 0, BEGIN DOWN SEQ.
0057  R   020A
0058      E536          LDM,3,6        U.CST          IS CHANNEL STATUS UP?
0059  X   001A
005A      713F          SBRB,3,15      $+4            YES GO TO NORMAL PROCESSING
005B  R   005E
005C      E700          BRU            MFAZ1
005D  R   007D
005E      8606          TBMB,0,6       U.IHB,NXTCH    IS PROC INHIBITED ON THIS CHAN?
005F  X   0004
0060  R   00DF
0061      84F6          ABMB,15,6      U.RTY,MFAZ1    NO, BEGIN CHANNEL UP SEQUENCE
0062  X   0003
0063  R   007D
                        * WHEN U.RTY REACHES 0, LOG CHANNEL UP, SET PARMS. ACCORDINGLY
0064      0956          MBL,5,6                       GET CHAN FOR E$LOG CALL
0065      E740          BLM,4          E:LOG          LOG CHANNEL AS 'U'
0066  X   001B
0067      E556          LDM,5,6        U.CST          SET CHANNEL STATUS PRIOR TO COMMING U
0068  X   001A
0069      654F          LBR,4,15
006A      E646          STM,4,6        U.CST          SET CHANNEL STATUS TO 1 (UP)
006B  X   001A
006C      765D          TBRB,5,13      $+4            IF FORMER STATUS WAS DOWN, RESET VALS
006D  R   0070
006E      E700          BRU            MFAZ1          IF NOT, CONTINUE LIKE NUTTIN HAPPEN
006F  R   007D
0070      6C44          ZRR,4
0071      E646          STM,4,6        U.TRF               U.TRF=0
0072  X   0015
0073      E646          STM,4,6        UBADT               UBADT=0
0074  R   0315
0075      E646          STM,4,6        UBADS               UBADS=0
0076  R   0323
0077      E646          STM,4,6        U.CPC               U.CPC=0
0078  X   0012
0079      E550          LDM,5          U.LTF
007A  X   000C
007B      E656          STM,5,6        U.FAC               U.FAC=U.LTF
007C  X   0006
007D      EDF0  MFAZ1   LDI,15         U.WRK          R15 POINTS TO FIRST TIME ENTRY
007E  X   0002
007F      E8F0          ADI,15         41              (U.WRK+41)
0080  A   0029
0081      EDE0          LDI,14         45             R14 SAMPLE POINTER
0082  A   002D
```

```
100     0083     6CAA        ZRR,10                          R10,R11 SERVE AS UACC
101     0084     6CBB        ZRR,11
102     0085     6CCC        ZRR,12                          R12,R13 SERVE AS U2ACC
103     0086     6CDD        ZRR,13
104                       * BEGIN LOOP BY COMPUTING LOCATION OF FAZ POINT IN R2
105     0087     ED30  MFAZ3 LDI,3          #3               GET CHANNEL
        0088   A 0003
106     0089     2036        MPR,3,6
107     008A     6D23        TRR,2,3
108     008B     682E        ADR,2,14                        GET SAMPLE POINTER, SUM INTO R2
109     008C     E552        LDM,5,2        U.WRK            GET PHASE POINT
        008D   X 0002
110     008E     7650        TBRB,5,0       $+3
        008F   R 0091
111     0090     F703        HOP,$+3
112     0091     6250        ZBR,5,0                         CLEAR CYCLE SHIFT BIT
113     0092     6380        OBR,8,0                         SET FLAG BIT IN R8
114     0093     E056        ADM,5,6        U.CCN            ADD CYCLE SHIFT COMPENSATION
        0094   X 0007
115     0095     6D45        TRR,4,5
116     0096     E146        SUM,4,6        WINMN            IS POINT LOWER THAN WINMN?
        0097   R 03A1
117     0098     7640        TBRB,4,0       FINDN            BRU IF IT IS
        0099   R 009F
118     009A     6D45        TRR,4,5
119     009B     E146        SUM,4,6        WINMX            IS POINT GREATER THAN WINMX?
        009C   R 0393
120     009D     7640        TBRB,4,0       MFAZ2            BRU IF IT IS NOT
        009E   R 00A3
121     009F     E740  FINDN BLM,4          COMPR            STORE NEW COMPRESSED POINT
        00A0   R 0290
122     00A1     E740        BLM,4          NEWIN            COMPARE NEW WINDOW LIMITS
        00A2   R 02AF
123     00A3     7650  MFAZ2 TBRB,5,0       $+4
        00A4   R 00A7
124     00A5     6C44        ZRR,4                           POSITIVE VALUE
125     00A6     F702        HOP,$+2
126     00A7     674F        GMR,4,15                        NEGATIVE VALUE
127     00A8     22A4        DAR,10,4                        DOUBLE PRECISION:VACC+CUR.POINT
128     00A9     E156        SUM,5,6        XBAR             (PHASE - XBAR)
        00AA   R 0385
129     00AB     2045        MPR,4,5                           SQUARED
130     00AC     22C4        DAR,12,4                        DBL.PREC:U2ACC=U2ACC+(CURPOINT)**2
131     00AD     7680        TBRB,8,0       $+3
        00AE   R 00B0
132     00AF     F709        HOP,$+9
133     00B0     6280        ZBR,8,0                         CLEAR FLAG BIT
134     00B1     E546        LDM,4,6        U.CYC
        00B2   X 0001
135     00B3     C046        ADMM,4,6       U.CCN            U.CCN=U.CCN+U.CYC;UPDATE CYCLE COUNT~
```

```
        00B4  X  0007
136     00B5     6C44      ZRR,4
137     00B6     E646      STM,4,6       U.CYC        CLEAR CYCLE SHIFT FLAG FOR CHAN
        00B7  X  0001
138     00B8     E8E0      ADI,14        44
        00B9  A  002C
139     00BA     ED30      LDI,3         485
        00BB  A  01E5
140     00BC     793E      SURB,3,14     MFAZ3        LOOP THRU 10 SAMPLES
        00BD  R  0087
141     00BE     6D16      TRR,1,6                    GET DOUBLE PRECISION DATA POINTER
142     00BF     2F11      LAS,1,1
143     00C0     E541      LDM,4,1       UACC1        DBL.PREC.:UACC1=UACC1+UACC
        00C1  R  0331
144     00C2     E551      LDM,5,1       UACC1+1
        00C3  R  0332
145     00C4     224A      DAR,4,10
146     00C5     E641      STM,4,1       UACC1
        00C6  R  0331
147     00C7     E651      STM,5,1       UACC1+1
        00C8  R  0332
148     00C9     E541      LDM,4,1       U2ACC        DBL.PREC:U2ACC=U2ACC+CUR.U2ACC
        00CA  R  034D
149     00CB     E551      LDM,5,1       U2ACC+1
        00CC  R  034E
150     00CD     224C      DAR,4,12
151     00CE     E641      STM,4,1       U2ACC
        00CF  R  034D
152     00D0     E651      STM,5,1       U2ACC+1
        00D1  R  034E
153     00D2     ED40      LDI,4         10
        00D3  A  000A
154     00D4     21A4      DVR,10,4                   GET 10 SECOND AVERAGE PHASE
155     00D5     F510      LDM,1         U.LSP        FIND STORAGE POINTER
        00D6  X  0009
156     00D7     6816      ADR,1,6                    ADD ROW POINTER AND CHAN POINTER
157     00D8     E6B1      STM,11,1      U.LST        STORE AVER
        00D9  X  0008
```

```
159     00DA      602F        ABR,2,15                      MOVE DATA POINTER TO BLANKING VALUE
160     00DB      E542        LDM,4,2        U.WRK          GET DATA BLANK VALUE
        00DC  X   0002
161     00DD      C046        ADMM,4,6       UBACC          UBACC=UBACC+CUR.VALUE
        00DE  R   03BF
162     00DF      606F  NXTCH ABR,6,15                      MOVE POINTER TO NEXT CHANNEL
163     00E0      ED40        LDI,4          14
        00E1  A   000E
164     00E2      7946        SURB,4,6       RTA1           LOOP THROUGH 14 CHANNELS
        00E3  R   0001
165     00E4      ED10        LDI,1          14
        00E5  A   000E
166     00E6      C010        ADMM,1         U.LSP          MOVE POINTER TO NEXT ROW
        00E7  X   0009
167     00E8      ED10        LDI,1          140
        00E9  A   008C
168     00EA      E110        SUM,1          U.LSP          SEE IF TIME TO RESET POINTER
        00EB  X   0009
169     00EC      7D11        TRRB,1,1       $+4             NO, CONTINUE.
        00ED  R   00F0
170     00EE      E610        STM,1          U.LSP          RESET TO TOP OF BUFFER
        00EF  X   0009
171                           ****************************************************************
172                           * GAIN AND BLANKING LEVEL CONTROL SECTIONS.....
173                           *   ENTRY TO THIS SECTION IS CONTROLLED BY THE GAIN CLOCK, WHICH PERMITS
174                           *   EXECUTION EVERY TWO MINUTES.
175                           * GAIN ADJUSTMENTS ARE MADE BASED ON THE NUMBER OF HIGH AND LOW VALUES
176                           *   TALLIED IN THE MONITOR SECTION.
177                           * BLANKING LEVEL ADJUSTMENTS ARE MADE BASED ON THE AVERAGE BLANKING
178                           *   LEVEL IN UBACC RELATIVE TO MAXIMUM AND MINIMUM PERMITTED VALUES.
179     00F0      84F0        ABMB,15        GCLCK,CTCLK
        00F1  R   03D0
        00F2  R   016C
180     00F3      6C66        ZRR,6                         RESET CHANNEL POINTER TO FIRST CHAN
181     00F4      E7F0  RTLOP BLM,15         CANI           SEE IF PARM CHANGE O.K.
        00F5  R   0268
182     00F6      E700        BRU            RSTAL           NO, GO ON AROUND CHANGE.
        00F7  R   0152
183                           * O.K. WE'VE ESTABLISHED THAT IT'S ALL RIGHT TO ADJUST THE GAIN OR
184                           *   BLANKING LEVEL AS NEEDED
185     00F8      EDA0        LDI,10         90             LIMITER FOR LOW VALUE TALLY
        00F9  A   005A
186     00FA      E1A6        SUM,10,6       LOVTY
        00FB  R   02F6
187     00FC      76A0        TBRB,10,0      LOGAN          BRU IF GAIN IS TOO LOW
        00FD  R   0106
188     00FE      EDA0        LDI,10         90
        00FF  A   005A
189     0100      E1A6        SUM,10,6       HIVTY
        0101  R   0304
```

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190   0102     76A0        TBRB,10,0     HIGAN        BRU IF GAIN IS TOO HIGH
      0103  R  0114
191   0104     E700        BRU           CKBLL        NO GAIN CHANGE NEEDED
      0105  R  0127
192   0106     E5A6  LOGAN LDM,10,6      U.GAN        CHECK TO SEE IF GAIN IS AT MAX SET.
      0107  X  001C
193   0108     F9A0        SUI,10        24
      0109  A  0018
194   010A     7DAA        TRRB,10,10    $+4
      010B  R  010E
195   010C     E700        BRU           CKBLL        GAIN ALREADY AT MAX, NO CHANGE
      010D  R  0127
196   010E     80F6        ABMM,15,6     U.GAN
      010F  X  001C
197   0110     E5A6        LDM,10,6      U.GAN
      0111  X  001C
198   0112     E700        BRU           GCHNG
      0113  R  011D
199   0114     E5A6  HIGAN LDM,10,6      U.GAN        CHECK TO SEE IF GAIN IS AT MIN SET.
      0115  X  001C
200   0116     7DAA        TRRB,10,10    $+4
      0117  R  011A
201   0118     E700        BRU           CKBLL
      0119  R  0127
202   011A     61AF        SBR,10,15                  DECREMENT GAIN
203   011B     E6A6        STM,10,6      U.GAN
      011C  X  001C
204   011D     E6A0  GCHNG STM,10        GPARM        PASS NEW GAIN VALUE TO LOG ROUTINE
      011E  R  0126
205   011F     8200        OBMM,0        CFLAG        SET CHANGE MADE FLAG
      0120  R  03CD
206   0121     0956        MBL,5,6                    SET UP R5 FOR E$LOG CALL
207   0122     E850        ADI,5         #04          MSG NO. FOR |GC| MESSAGE
      0123  A  0004
208   0124     E740        BLM,4         E:LOG
      0125  X  001B
209   0126  A  0000  GPARM DFC           0            NEW GAIN VALUE
```

```
211   0127     E5A6  CKBLL LDM,10,6      UBACC
      0128  R  03BF
212   0129     E1A0        SUM,10        BLKMN        CHECK AGAINST MIN. VALUE....
      012A  R  03CE
213   012B     76A0        TBRB,10,0     LOBLK        IF R10<0, THEN LEVEL IS TOO LOW
      012C  R  013F
214   012D     E1A0        SUM,10        BLKMX        CHECK AGAINST MAX. VALUE....
      012E  R  03CF
215   012F     76A0        TBRB,10,0     RSTAL        IF R10<0, THEN NO CHANGE NEEDED
      0130  R  0152
216   0131     E5A6        LDM,10,6      U.BLL        CHECK TO SEE IF AT MAX SETTING
      0132  X  000F
217   0133     E9A0        SUI,10        63
      0134  A  003F
218   0135     7DAA        TRRB,10,10    $+4
      0136  R  0139
219   0137     E700        BRU           RSTAL        BLANK LEVEL AT MAX SETTING
      0138  R  0152
220   0139     80F6        ABMM,15,6     U.BLL        INCREMENT SETTING
      013A  X  000F
221   013B     E5A6        LDM,10,6      U.BLL
      013C  X  000F
222   013D     E700        BRU           BCHNG
      013E  R  0148
223   013F     E5A6  LOBLK LDM,10,6      U.BLL        CHECK TO SEE IF AT MIN SETTING
      0140  X  000F
224   0141     7DAA        TRRB,10,10    $+4            ?
      0142  R  0145
225   0143     E700        BRU           RSTAL        BLANK LEVEL AT MIN SETTING
      0144  R  0152
226   0145     61AF        SBR,10,15
227   0146     E6A6        STM,10,6      U.BLL
      0147  X  000F
228   0148     E6A0  BCHNG STM,10        BPARM        PASS NEW BLANK LEVEL TO E$LOG
      0149  R  0151
229   014A     8200        OBMM,0        CFLAG        SET CHANGE MADE FLAG
      014B  R  03CD
230   014C     0956        MBL,5,6                    SET UP R5 FOR E$LOG CALL
231   014D     F850        ADI,5         #05          MSG NO. FOR |BC|MESSAGE
      014E  A  0005
232   014F     E740        BLM,4         E:LOG
      0150  X  001B
233   0151  A  0000  BPARM DFC           0            NEW BLANK LEVEL
234   0152     6C44  RSTAL ZRR,4                      RESET COUNTERS
235   0153     E646        STM,4,6       HIVTY         HI VALUE GAIN COUNTER
      0154  R  0304
236   0155     E646        STM,4,6       LOVTY         LO VALUE GAIN COUNTER
      0156  R  02F6
237   0157     E646        STM,4,6       UBACC         BLANK LEVEL AVERAGER
      0158  R  03BF
```

```
238     0159      8600        TBMB,0        CFLAG,$+5     DOES CHANNEL HAVE PARAMETER CHANGE
        015A  R   03CD
        015B  R   015F
239     015C      E700        BRU           NXTCN         GO ON TO NEXT CHANNEL, NO CHANGE
        015D  R   0163
240     015E      8100        ZBMM,0        CFLAG         RESET FLAG
        015F  R   03CD
241     0160      6D36        TRP,3,6                     SET CHANNEL IN R3
242     0161      E750        BLM,5         E:MIT          GO MAKE CHANGE
        0162  X   000E
243     0163      606F  NXTCN ABR,6,15                    MOVE TO NEXT CHANNEL
244     0164      ED50        LDI,5         14
        0165  A   000F
245     0166      7956        SURB,5,6      RTLOP         LOOP THRU 14 CHANNELS, THEN
        0167  R   00F4
246     0168      ED50        LDI,5         -12            RESET GAIN CLOCK TO -12 (120 SEC)
        0169  A   FFF4
247     016A      E650        STM,5         GCLCK
        016B  R   03D0
```

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                        ***********************************************************************
                        * TRACK RATE CONTROL SECTION............
                        *   ENTRY TO THIS SECTION IS CONTROLLED BY THE TRACK CLOCK,  WHICH
                        *   PERMITS EXECUTION EVERY 1 1/2 MINUTES.
                        * TRACK RATE ADJUSTMENTS ARE MADE BASED ON THE STANDARD DEVIATION OF
                        *   THE PHASE INPUT, SO NATURALLY WE HAVE TO COMPUTE IT FIRST.
016C        84F0        CTCLK ABMB,15        TCLOK,=INI
016D   R    03D1
016E   R    01FB
016F        6C66              ZRR,6                          RESET CHANNEL POINTER TO FIRST CHAN
                        * DO STANDARD DEVIATION COMPUTATION....
0170        6D56        STDEV TRR,5,6                        R6 HAS CHANNEL POINTER
0171        2D51              LLS,5,1                        R5 HAS D.P. DATA CHANNEL POINTER
                        * SIGMA=SQRT(U2ACC/89)
0172        E525              LDM,2,5        U2ACC           R2,R3 HAS U2ACC
0173   R    034D
0174        E535              LDM,3,5        U2ACC+1
0175   R    034E
0176        EDA0              LDI,10         8900            R10=8900
0177   A    22C4
0178        212A              DVR,2,10
0179        6DD2              TRR,13,2                       R13 HAS REMAINDER
017A        ED40              LDI,4          100             R4=100
017B   A    0064
017C        ED70              LDI,7          89              R7=89
017D   A    0059
017E        6CCC              ZRR,12                         R12,R13=REMAINDER
017F        21C7              DVR,12,7
0180        6CCC              ZRR,12                         R13=REM*100/89
0181        2024              MPR,2,4                        R2,R3=U2ACC/8900*100
0182        22C2              DAR,12,2                       R12,R13=U2ACC(D.P.)/89
0183        E7F0              BLM,14         E:SPT           TAKE SQUARE ROOT
0184   X    0008
0185        E526              LDM,2,6        SIGMA           SAVE LAST SIGMA
0186   R    0369
0187        E626              STM,2,6        LSIGM
0188   R    0377
0189        E6D6              STM,13,6       SIGMA           STORE SIGMA AWAY
018A   R    0369
                        * NOW UPDATE XBAR:
                        *    XBAR=(UACC1/90)
018B        ED70              LDI,7          90
018C   A    005A
018D        E5C5              LDM,12,5       UACC1
018E   R    0331
018F        E5D5              LDM,13,5       UACC1+1
0190   R    0332
0191        21C7              DVR,12,7                       R12=UACC1/90
0192        E9C0              SUI,12         45
0193   A    002D
```

```
284     0194     76C0        TBRB,12,0      $+3
        0195  R  0197
285     0196     60DF        ABR,13,15
286     0197     E6D6        STM,13,6       XBAR
        0198  R  0385
287                       * CLEAR ACCUMULATORS,
288                       *   UACC1=0
289                       *   U2ACC=0
290     0199     6C44        ZRR,4
291     019A     E645        STM,4,5        UACC1
        019B  R  0331
292     019C     E645        STM,4,5        UACC1+1
        019D  R  0332
293     019E     E645        STM,4,5        U2ACC
        019F  R  034D
294     01A0     E645        STM,4,5        U2ACC+1
        01A1  R  034E
295                       * DO NOT CHANGE DELTA IF PROCESSING A TRIGGER
296     01A2     E536        LDM,3,6        U.AST
        01A3  X  0005
297     01A4     613E        SBR,3,14
298     01A5     7630        TBRB,3,0       $+4
        01A6  R  01A9
299     01A7     E700        BRU            ADJTR
        01A8  R  01BE
300                       * THE DATA COMPRESSION IS 2*DELTA WIDE, WHERE:
301                       *    DELTA=LSIGM*K
302     01A9     E5D6        LDM,13,6       LSIGM
        01AA  R  0377
303     01AB     E530        LDM,3          K+1
        01AC  R  03BE
304     01AD     202D        MPP,2,13                      R2=FRACTION PART
305     01AE     2E21        LAD,2,1
306     01AF     E530        LDM,3          K
        01B0  R  03BD
307     01B1     20C3        MPR,12,3                      R13=INTEGER PART
308     01B2     68D2        ADR,13,2
309     01B3     E6D6        STM,13,6       DELTA
        01B4  R  03AF
310                       * SET MINIMUM WINDOW WIDTH OF 2 MICROSECONDS,
311                       *    THAT IS, A MINIMUM DELTA = 1 MICROSECOND.
312     01B5     61DB        SBR,13,11
313     01B6     76D0        TBRB,13,0      $+3
        01B7  R  01B9
314     01B8     F704        HOP,$+4                       HOP IF VAL O.K..
315     01B9     65DB        LBR,13,11
316     01BA     E6D6        STM,13,6       DELTA          SET TO 1 MICROSECOND
        01BB  R  03AF
317     01BC     E740        BLM,4          NEWIN          SET NEW WINDOW
        01BD  R  02AF
```

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                        *ADJUST TRACKING RATE BASED ON HOW SIGMA FARES RELATIVE TO FIXED
                        *   LIMITS.......
01BE      E7F0  ADJTR BLM,15        CANI          CAN I ADJUST.RATE?
01BF  R   0268
01C0      E700        BRU           NEXTC         NO, GO TO NEXT CHANNEL
01C1  R   01F2
01C2      E546        LDM,4,6       SIGMA         CHECK FOR TOO LOW FIRST
01C3  R   0369
01C4      E140        SUM,4         TRMIN
01C5  R   03D3
01C6      7640        TBRB,4,0      LOTR          BRU IF T.R. IS LOW
01C7  R   01D0
01C8      E540        LDM,4         TRMAX
01C9  R   03D2
01CA      E146        SUM,4,6       SIGMA
01CB  R   0369
01CC      7640        TBRB,4,0      HITR          BRU IF TR IS HIGH
01CD  R   01DE
01CE      E700        BRU           NEXTC
01CF  R   01F2
01D0      E5A6  LOTR  LDM,10,6      U.TRK         CHECK IF T.R. IS AT MAX
01D1  X   0010
01D2      E9A0        SUI,10        9
01D3  A   0009
01D4      7DAA        TRPB,10,10    $+4
01D5  R   01D8
01D6      E700        BRU           NEXTC         T.R. ALREADY AT MAX
01D7  R   01F2
01D8      80F6        ABMM,15,6     U.TRK         INCREMENT T.R.
01D9  X   0010
01DA      E5A6        LDM,10,6      U.TRK
01DB  X   0010
01DC      E700        BRU           TCHNG
01DD  R   01E7
01DE      E5A6  HITR  LDM,10,6      U.TRK         CHECK IF T.R. IS AT MIN
01DF  X   0010
01F0      7DAA        TRPB,10,10    $+4
01E1  R   01E4
01E2      E700        BRU           NEXTC         T.R. ALREADY AT MIN
01E3  R   01F2
01E4      61AF        SBR,10,15                   DECREMENT T.R.
01E5      E6A6        STM,10,6      U.TRK
01E6  X   0010
01E7      E6A0  TCHNG STM,10        TPARM         PASS NEW TR TO E$LOG
01E8  R   01EE
01F9      0956        MBL,5,6                     SET UP R5 FOR E$LOG CALL
01EA      E850        ADI,5         #03           MSG NO. FOR |TC| MESSAGE
01EB  A   0003
01EC      E740        BLM,4         E:LOG
01ED  X   001B
```

```
346   01EE  A  0000  TPARM DFC          0              NEW TR VALUE
347   01EF     6D36        TRR,3,6                      SET CHANNEL IN R3
348   01F0     E750        BLM,5        E:MIT           GO MAKE CHANGE
      01F1  X  000E
349   01F2     606F  NEXTC ABR,6,15                     MOVE TO NEXT CHANNEL
350   01F3     ED50        LDI,5        14
      01F4  A  000F
351   01F5     7956        SURB,5,6     STDEV           LOOP THRU 14 CHANNELS, THEN
      01F6  R  0170
352   01F7     ED50        LDI,5        -9               RESET TR CLOK TO -9 .
      01F8  A  FFF7
353   01F9     E650        STM,5        TCLCK
      01FA  R  03D1
354                      * NOW MOVE LAST ROW OF U.WRK (MOST CURRENT DATA) TO THE FIRST
355                      *  TO SET UP FOR NEXT TEN SECONDS ENTRY TO U$RTA.
356   01FB     ED50  FINI  LDI,5        U.WRK
      01FC  X  0002
357   01FD     6D65        TRR,6,5
358   01FE     E860        ADI,6        440             R6=U.WRK+440
      01FF  A  0188
359   0200     ED70        LDI,7        -44
      0201  A  FFD4
360   0202     FD46        LDX,4,6
361   0203     FE45        STX,4,5
362   0204     605F        ABR,5,15
363   0205     606F        ABR,6,15
364   0206     707F        ABRB,7,15    $-4             LOOP THRU 44 POINTS
      0207  R  0202
365   0208     E700        BRU          U:LSQ           GO ON TO LEAST SQUARES PGM
      0209  X  0011
```

```
                        * WHEN MUBAV IS SET OTHER THAN 0, INDICATING |BAD| DATA,
                        *   THE CHANNEL IS PUT INTO A DOWN SEQUENCE WHICH EVENTUALLY
                        *   PUTS THE CHANNEL INTO A DOWN STATE IF THE LOW QUALITY
                        *   DATA CONTINUES.
                        * ENTER WITH MUBAV IN R3, CHANNEL IN R6
     020A      8606     DNSEQ TBMB,0,6      U.IHB,STREC     BRU IF PROC INHIBITED
     020B  X   0004
     020C  R   0215
     020D      E556          LDM,5,6       U.CST
     020E  X   001A
     020F      E70D          BRU*,5        JMPTB-1
     0210  R   0210
                        * THE NEXT STEP DEPENDS ON WHAT THE CURRENT STATUS IS...
     0211  R   021B     JMPTB DFC           ISUP            U.CST=1, UP
     0212  R   0224           DFC           ISCNR           U.CST=2, COAST,NO-REPORT
     0213  R   0250           DFC           ISCR            U.CST=3, COAST,REPORT
     0214  R   0215           DFC           STREC           U.CST=4, DOWN
     0215      ED50     STREC LDI,5         -18
     0216  A   FFEE
     0217      E656          STM,5,6       U.RTY           RESET RECOVERY TALLY
     0218  X   0003
     0219      E700          BRU           NXTCH           AND EXIT
     021A  R   00DF
     021B      80F6     ISUP  ABMM,15,6     U.CST           SET STATE = COAST NO REPORT
     021C  X   001A
     021D      655F          LBR,5,15
     021E      E656          STM,5,6       UBADT           SET BAD TALLY = 1
     021F  R   0315
     0220      E636          STM,3,6       UBADS           ADD MUBAV TO BAD SUM
     0221  R   0323
     0222      E700          BRU           STREC
     0223  R   0215
     0224      80F6     ISCNR ABMM,15,6     UBADT           INCRM BAD TALLY
     0225  R   0315
     0226      C036          ADMM,3,6      UBADS           ADD MUBAV TO BAD SUM
     0227  R   0323
     0228      E556          LDM,5,6       UBADT
     0229  R   0315
     022A      E950          SUI,5         3
     022B  A   0003
     022C      7D55          TRRB,5,5      STREC           CHECK OF TALLY=3
     022D  R   0215
     022E      80F6          ABMM,15,6     U.CST           YES, UP STATE TO COAST REPORT
     022F  X   001A
     0230      E556          LDM,5,6       UBADS
     0231  R   0323
     0232      E950          SUI,5         3
     0233  A   0003
     0234      7D55          TRRB,5,5      $+4
     0235  R   0238
```

```
397     0236     E700        BRU            CSMSG
        0237  R  0248
398     0238     E556        LDM,5,6        UBADS
        0239  R  0323
399     023A     E850        ADI,5          3
        023B  A  0003
400     023C     7D55        TRRB,5,5       $+4
        023D  R  0240
401     023E     E700        BRU            CFMSG
        023F  R  024C
402     0240     ED70        LDI,7          15              MSG NO. FOR |CN|
        0241  A  000F
403     0242     0956  LOGCR MBL,5,6                        SET UP CHAN FOR LOG MSG.
404     0243     6857        ADR,5,7                        ADD IN MSG NO.
405     0244     E740        BLM,4          E:LOG           LOG COASTING AND REASON
        0245  X  001B
406     0246     E700        BRU            STREC
        0247  R  0215
407     0248     ED70  CSMSG LDI,7          16              MSG NO FOR |CS|
        0249  A  0010
408     024A     E700        BRU            LOGCR
        024B  R  0242
409     024C     ED70  CFMSG LDI,7          14              MSG NO FOR CF
        024D  A  000E
410     024E     E700        BRU            LOGCR
        024F  R  0242
411     0250     80F6  ISCR  ABMM,15,6      UBADT           INCREM BAD TALLY
        0251  R  0315
412     0252     E556        LDM,5,6        UBADT
        0253  R  0315
413     0254     E950        SUI,5          30              IS BAD TALLY = 30?
        0255  A  001E
414     0256     7D55        TRRB,5,5       STREC
        0257  R  0215
415     0258     80F6        ABMM,15,6      U.CST           YES, GO DOWN
        0259  X  001A
416     025A     0956        MBL,5,6
417     025B     E850        ADI,5          17              MSG NO FOR |D| MESSAGE
        025C  A  0011
418     025D     E740        BLM,4          E:LOG           LOG DOWN CHANNEL
        025E  X  001B
419     025F     6C44        ZRR,4                          RESET
420     0260     E646        STM,4,6        UBADT            BAD TALLY
        0261  R  0315
421     0262     E646        STM,4,6        UBADS            BAD SUM
        0263  R  0323
422     0264     E646        STM,4,6        U.CCN            CYCLE COUNTER
        0265  X  0007
423     0266     E700        BRU            STREC
        0267  R  0215
```

```
424                 **************END MAINLINE OF U$RTA**********************************
```

```
                        ***********************************************************************
                        * CANI IS A SUBROUTINE TO DETERMINE OF I CAN MAKE A PARAMETER
                        *  ADJUSTMENT.  ADJUSTMENTS ARE NOT PERMITTED IF VAVEFORM ANALYSIS
                        *  INDICATES A REPORTABLE SIGNAL IS PROBABLY IN PROGRESS.  THE
                        *  FOLLOWING CRITERIA ARE USED TO DETERMINE IF THERE MIGHT BE A
                        *  SIGNAL UNDERWAY:
                        *   1.  U.AST, THE ALARM STATUS, SHOWS A PEAK HAS BEEN FOUND (>4)
                        *   2.  THE ELAPSED TIME FROM ONSET IS LONGER THAN 50 SECONDS.
                        * CALLING SEQUENCE:
                        *     BLM,15        CANI    (R6=CHAN)
                        *     (RETURN IF NOT PERMITTED)
                        *     (RETURN IF CHANGES O.K.)
0268      A5C0  CANI  SFM,12        THOLD          SAVE R4
0269  R   0288
026A      EDC0        LDI,12        #3
026B  A   0003
026C      E1C6        SUM,12,6      U.CST
026D  X   001A
026E      76C0        TBRB,12,0     CANRT          BRU IF DOWN OR COAST REPORTED
026F  R   0285
0270      86F6        TBMB,15,6     M.STA,CANRT    NO CHANGE IN MANUAL
0271  X   0021
0272  R   0285
0273      EDC0  CANI1 LDI,12        #4
0274  A   0004
0275      E1C6        SUM,12,6      U.AST
0276  X   0005
0277      76C0        TBRB,12,0     CANRT          BRU IF SIGNAL PAST PEAK
0278  R   0285
0279      E7E0        BLM,14        E:DIF          GET TIME SINCE ONSET
027A  X   000A
027B  X   0014        DFC           U.CTM          LOC. OF CURRENT TIME
027C      F707        HOP,$+7
027D      6600        NOP
027E      EDE0        LDI,14        50
027F  A   0032
0280      69ED        SUR,14,13                    BRU IF > 50 SEC PAST PEAK
0281      76F0        TBRB,14,0     CANRT
0282  R   0285
                      * IF YOU MAKE IT THIS FAR, YOU MAY MAKE A PARM ADJUSTMENT.
0283      80E0        ABMM,14       THOLD+3        ADJ. RETURN ADDRESS
0284  R   028B
0285      A4C0  CANRT LFM,12        THOLD
0286  R   0288
0287      FF0F        BRX,15
0288            THOLD RES           4              RETURN
028C      A5C0  U:CNI SFM,12        THOLD
028D  R   0288
028E      E700        BRU           CANI1
028F  R   0273
```

```
                    ****************************************************************
                    * COMPR ESTABLISHES A NEW COMPRESSED POINT, IT:
                    *   1. SETS A NEW WINDOW CENTER
                    *   2. SAVES POINT VALUE AND TIME
                    * NEWIN ESTABLISHES A NEW DATA WINDOW WHEN:
                    *   1. A NEW CENTER HAS BEEN FOUND
                    *   2. A NEW DELTA HAS BEEN COMPUTED
                    * CALLING SEQUENCE......
                    *     BLM,4          COMPR
                    *    (CUR. VAL IN R5, TIME IN LOC. AT R14,R15)
                    *     BLM,4          NEWIN
0290      A510  COMPR SFM,1          TREGS          SAVE REGISTERS
0291  R   02C0
0292      E656        STM,5,6        CENTR          SET NEW COUNTER
0293  R   03D4
0294      ED30        LDI,3          3
0295  A   0003
0296      A026        MPM,2,6        U.CPC          ENTRY COUNTER
0297  X   0012
0298      E036        ADM,3,6        U.CPP          BUFFER POINTER
0299  X   001F
029A      FE53        STX,5,3                       STORE DATA IN BUFFER
029B      603F        ABR,3,15                      STORE LOC. FOR TIME
029C      6D7E        TRR,7,14
029D      687F        ADR,7,15                      TIME POINTER
029E      FD57        LDX,5,7                       GET TIME
029F      FE53        STX,5,3                       STORE IN BUFFER
02A0      E650        STM,5          E.TM1
02A1  X   0017
02A2      607F        ABR,7,15
02A3      603F        ABR,3,15
02A4      FD57        LDX,5,7                        SECOND TIME WORD
02A5      FE53        STX,5,3                        AND STORE
02A6      E650        STM,5          E.TM2
02A7  X   0018
02A8      80F6        ABMM,15,6      U.CPC           BUMP COMP. POINT COUNTER
02A9  X   0012
02AA      760B        TBRB,0,11      CMPCT
02AB  R   02C7
02AC      A410  COMRT LFM,1          TREGS          RESTORE REGISTERS
02AD  R   02C0
02AE      FF04        BRX,4                         AND RETURN
02AF      A510  NEWIN SFM,1          TREGS          MAX=CENTER + DELTA
02B0  R   02C0
02B1      E556        LDM,5,6        CENTR
02B2  R   03D4
02B3      E056        ADM,5,6        DELTA
02B4  R   03AF
02B5      E656        STM,5,6        WINMX
02B6  R   0393
```

```
497     02B7     E556        LDM,5,6       CENTR          MIN=CENTER - DELTA
        02B8  R  03D4
498     02B9     E156        SUM,5,6       DELTA
        02BA  R  03AF
499     02BB     E656        STM,5,6       WINMN
        02BC  R  03A1
500     02BD     A410        LFM,1         TREGS
        02BE  R  02C0
501     02BF     FF04        BRX,4                        RETURN
502     02C0              TREGS RES       7
503                       ***************************************************************
```

```
                        ****************************************************************
                        * IF BIT 11 OF THE SWITCH REGISTER IS SET, ALL COMPRESSED DATA
                        *   POINTS ON THE CHANNEL GIVEN IN BITS 12-15 WILL BE LISTED
                        *   ON THE ASR 35.
 02C7      6D10  CMPCT TRR,1,0
 02C8      EA10        FTI,1          #FFF0          GET CHANNEL FROM R0
 02C9  A   FFF0
 02CA      7916        SURB,1,6       COMRT          BRU IF NOT THIS CHANNEL
 02CB  R   02AC
 02CC      A5A0        SFM,10         COSVR
 02CD  R   02EC
 02CE      E7E0        BLM,14         E:FCT          SET UP POINT'S TIME
 02CF  X   0019
 02D0  R   02E0        DFC            LSTMS
 02D1      E5C6        LDM,12,6       CENTR          GET PHASE VALUE
 02D2  R   03D4
 02D3      E7F0        BLM,15         E:FMF          SET UP OUTPUT
 02D4  X   001F
 02D5  R   02E5        DFC            LSTMG
 02D6      6CEE        ZRR,14
 02D7      E6E0        STM,14         E.IOF
 02D8  X   0020
 02D9      E7F0        BLM,14         E:035          OUTPUT LINE
 02DA  X   0016
 02DB  R   02E0        DFC            LSTMS
 02DC      A4A0        LFM,10         COSVR          RESTORE REGISTERS
 02DD  R   02EC
 02DE      E700        BRU            COMRT
 02DF  R   02AC
 02E0  A   3132  LSTMS DFC            |123 123456|
 02E1  A   3320
 02E2  A   3132
 02E3  A   3334
 02E4  A   3536
 02E5  A   202B  LSTMG DFC            | +0037.46 |,#0D0A,#0000 '
 02E6  A   3030
 02E7  A   3337
 02E8  A   2E34
 02E9  A   3620
 02EA  A   0D0A
 02EB  A   0000
 02EC            COSVR RES            6
```

```
                    ********************************************************************
                    * GAIN CONTROL PARAMETERS....
                    * AMPMN...MINIMUM ACCEPTABLE AMPLITUDE VALUE.
                    * AMPMX...DIFF. BETWEEN MAX ACCEPTABLE AND MIN.
                    * AMPDP...VALUE BELOW WHICH PHASE CONSIDERED WORTHLESS.
                    * SATUR...SATURATION POINT, VALUE ABOVE WHICH PHASE CONSIDERED WORTHLESS
02F2  A  0266       AMPMN DFC          614            =30
02F3  A  029A       AMPMX DFC          666            =30+52.5=62.5
02F4  A  0233       AMPDP DFC          563            =30-27.5=2.5
02F5  A  02C3       SATUR DFC          707            =62.5+34.5=97
                    * LOVTY .. IS COUNTER OF POINTS BELOW AMPMN FOR EACH CHANNEL
                    * HIVTY .. IS COUNTER OF POINTS ABOVE AMPMN+AMPMX FOR EACH CHANNEL
02F6  A  0000       LOVTY RES          14,0
0304  A  0000       HIVTY RES          14,0
0312  A  0000       SATTY DFC          0              SATURATION TALLY DURING CUR. BLOCK
0313  A  0000       DRPTY DFC          0              DROP TALLY DURING CURRINT BLOCK
                    * MUBAV IS THE AMPLITUDE BAD SAMPLE FLAG.  IT'S SET TO +1 IF THE CHAN
                    *   IS SATURATED AND TO -1 IF THE SIGNAL DROPS OUT.
0314  A  0000       MUBAV DFC          0
                    * THE CHANNEL DOWN SEQUENCE USES TWO PARAMETERS:
                    *   UBADT IS THE TALLY OF BAD DATA BLOCKS AND DETERMINES WHEN CHANNEL
                    *    CHANGES STATE.
                    *   UBADS IS A SUM OF U.BAV AND IS USED TO DETERMINE WHY CHANNEL IS
                    *    CHANGING STATUS.
0315  A  0000       UBADT RES          14,0
0323  A  0000       UBADS RES          14,0
                    * THE STANDARD DEVIATION OF THE INPUT IS COMPUTED USING THE FOLLOWING:
                    * SIGMA=SQRT(SUM OF (FAZ-XBAR)**2
                    *   WHERE:
                    *     UACC1 = SUM OF CURRENT POINTS
                    *     U2ACC = SUM OF (CURRENT POINTS - XBAR)**2/89
                    *     XBAR  = ESTIMATE OF AVERAGE INPUT
0331  A  0000       UACC1 RES          28,0           (DOUBLE PRECISION)
034D  A  0000       U2ACC RES          28,0           (DOUBLE PRECISION)
      R  0369       U.SIG EQU          $
0369  A  0000       SIGMA RES          14,0
0377  A  0000       LSIGM RES          14,0
0385  A  0000       XBAR  RES          14,0
                    * COMPRESSED DATA POINTS ARE MAINTAINED IN THE U$DAT AREA, BUT THE
                    *   FOLLOWING ARE USED IN COMPRESSED DATA COMPUTATION.....
                    * WINMX AND WINMN ARE THE UPPER AND LOWER BOUNDS FOR THE CURRENT WINDOW~
                    *  DELTA IS SIGMA*K
0393  A  7FFF       WINMX RES          14,#7FFF
03A1  A  8000       WINMN RES          14,#8000
03AF  A  0000       DELTA RES          14,0
03BD  A  0001       K     DFC          #0001,#4000    =1.5
03BE  A  4000
                    * UBACC IS USED TO DETERMINE THE APPROXIMATE PERCENTAGE BLANKED.
                    *   THE LAST BLANKED PERCENTAGE VALUE FROM EACH 10 SECOND PERIOD IS
                    *   AVERAGED OVER TWO MINUTES.
```

```
03BF  A  0000  UBACC RES          14,0
03CD  A  0000  CFLAG DFC          0              BIT 0 = 1 IF ANY CHANGES TO BE MADE
               * BLANKING LEVEL CONTROL PARAMETERS: MIN AND MAX ALLOWED VALUES
03CE  A  00B9  BLKMN DFC          #B9
03CF  A  00A9  BLKMX DFC          #A9
               * GCLOK IS THE GAIN CLOCK....
               * TCLOK IS THE TRACK RATE CLOCK....
         R  03D0  U.TM3 EQU       $
03D0  A  FFF4  GCLOK DFC          -12
         R  03D1  U.TM4 EQU       $
03D1  A  FFF7  TCLOK DFC          -9
               ***************************************************************
               * TRACKING RATE CONTROL PARAMETERS......
               * TRMAX MAXIMUM STANDARD DEVIATION PERMITTED
               * TRMIN MINIMUM STANDARD DEVIATION PERMITTED
               * WHEN SIGMA FALLS OUTSIDE THESE BOUNDS, TRY TO BRING IT BACK
03D2  A  0014  TRMAX DFC          #14
03D3  A  0008  TRMIN DFC          #08
               ***************************************************************
               * CENTR IS THE COMPRESSED DATA POINT AT THE WINDOW CENTER
03D4  A  0000  CENTR RES          14,0
               ***************************************************************
03E2                 END
```

TOTAL ASSEMBLY ERRORS = 0 SIZE = 994

```
 1                          PGM          U$LSQ
 2                           INT          U:LSQ
 3                           EXT          U.LST,U.LSP,U:TGR,U.CST,U.SLP
 4                    *      CAT NO.  400100-003
 5                    * U$LSQ IS THE LEAST SQUARES SLOPE ESTIMATOR.
 6                    *   THE LAST 10 OF THE 10 SECOND PHASE AVERAGES ARE ANALYZED.
 7     0000     6C44  U:LSQ ZRR,4                          CLEAR SUMS
 8     0001     ED60        LDI,6        -28
       0002  A  FFE4
 9     0003     E646        STM,4,6      SUM+28
       0004  R  006F
10     0005     706F        ABRB,6,15    $-2
       0006  R  0003
11     0007     E550        LDM,5        U.LSP          R5=ROW POINTER
       0008  X  0002
12     0009     E540        LDM,4        TUMAX
       000A  R  0071
13     000B     6F44        TTR,4,4
14     000C     E640        STM,4        TUWAT          INIT. TUWAT=-TUMAX
       000D  R  006F
15     000E     6C66  NEXTA ZRR,6                          R6=CHANNEL POINTER(B)
16     000F     6D46  LOOP1 TRR,4,6
17     0010     2D41        LLS,4,1                        D.P.POINTER
18     0011     86D6        TBMB,13,6    U.CST,LASTB     BYPASS IF CHANNEL DOWN
       0012  X  0004
       0013  R  0024
19     0014     6D76        TRR,7,6
20     0015     6875        ADR,7,5                        POINT=A+B
21                    * SUM=SUM+2**4*TUWAT*U.LST
22     0016     E5D0        LDM,13       TUWAT
       0017  R  006F
23     0018     A0C7        MPM,12,7     U.LST          R12,13=U.LST*TUNAT
       0019  X  0001
24     001A     2ACC        RAD,12,12                    *2**4 (CLR MPY BY FRACTION)
25     001B     E5A4        LDM,10,4     SUM             +SUM
       001C  R  0053
26     001D     E5B4        LDM,11,4     SUM+1
       001E  R  0054
27     001F     22AC        DAR,10,12
28     0020     E6A4        STM,10,4     SUM            INTO SUM!
       0021  R  0053
29     0022     E6B4        STM,11,4     SUM+1
       0023  R  0054
30     0024     606F  LASTB ABR,6,15                       NEXT CHAN
31     0025     ED40        LDI,4        14
       0026  A  000E
32     0027     7946        SURB,4,6     LOOP1          LOOP THRU 14 CHANNELS
       0028  R  000F
33     0029     E850        ADI,5        14             NEXT ROW
       002A  A  000E
```

```
34    002B      ED40        LDI,4          140
      002C  A   008C
35    002D      7945        SURB,4,5       $+3
      002E  R   0030
36    002F      6D54        TRP,5,4                       RECYCLE ROW POINTER
37    0030      E540        LDM,4          U.LSP
      0031  X   0002
38    0032      7945        SURB,4,5       $+4            LOOP THRU 10 ROWS
      0033  R   0036
39    0034      E700        BRU            DONEA          THEN EXIT
      0035  R   003C
40    0036      E560        LDM,6          TUWDF
      0037  R   0070
41    0038      C060        ADMM,6         TUWAT          TUWAT=TUWAT+TUNDF
      0039  R   006F
42    003A      E700        BRU            NEXTA               AND DO NEXT ROW
      003B  R   000E
43                      * SLOPE=TUFAC*SUM FOR EACH CHAN.
44    003C      6C66* DONEA ZRR,6                         REINIT CHANNEL POINTER
45    003D      6D46  LOOP2 TRR,4,6
46    003E      2D41        LLS,4,1                       D.P. POINTER FOR CHANNEL
47    003F      E536        LDM,3,6        U.CST
      0040  X   0004
48    0041      E930        SUI,3          1              CHECK IF CHANNEL IS UP
      0042  A   0001
49    0043      7D33        TRRB,3,3       NEXTB          ...NO, DO NEXT CHANNEL
      0044  R   004C
50    0045      E5D4        LDM,13,4       SUM+1
      0046  R   0054
51    0047      A0C0        MPM,12         TUFAC          SUM*TUFAC
      0048  R   0072
52    0049      2EC1        LAD,12,1
53    004A      E6C6        STM,12,6       U.SLP           INTO U.SLP
      004B  X   0005
54    004C      606F  NEXTB ABR,6,15                      NEXT CHANNEL
55    004D      ED50        LDI,5          14
      004E  A   000E
56    004F      7956        SURB,5,6       LOOP2           LOOP THRU 14 CHANNELS
      0050  R   003D
57    0051      E700        BRU            U:TGR          DO TRIGGER DETECTION
      0052  X   0003
```

```
                    ****************************************************************
                    * SUM IS A DOUBLE PRECISION ACCUMULATOR FOR THE COMPUTATION
0053  A  0000  SUM   RES          28,0
006F  A  3999  TUWAT DFC          #3999          .45
0070  A  0CCC  TUWDF DFC          #0CCC          .10
0071  A  3999  TUMAX DFC          #3999          .45
0072  A  5D17  TUFAC DFC          #5D17          .727272
0073                END
```

TOTAL ASSEMBLY ERRORS = 0 SIZE = 115

```
 1                                PGM            U$TGR
 2                                 INT            U:TGR,U:GET,U.TRF,U.TRL
 3                                 EXT            U.CPC,U.CPP,U.AST,E:COT,E:DIF
 4                                 EXT            U:WFA,U.CDT,U.CDM,U.AMP,U.OAM
 5                                 EXT            U.DIU,U.ODI,U.OFZ,U.OTM,U.OTB
 6                                 EXT            U.CST,U.OSG,U.SIG,U.DTM,U.END
 7                                 EXT            U:RP2,U.CLS,U.LTF,U.FAC,U.LFZ
 8                                 EXT            U.LTM
 9                           *     CAT NO.  400100-005
10                           * U$TGR IS THE U-WAVEFORM TRIGGER DETECTION ROUTINE.
11      0000      6C66       U:TGR ZRR,6                          INIT CHANNEL COUNTER
12      0001      E546       NEXTP LDM,4,6        U.CST
        0002  X   0010
13      0003      714F             SBRB,4,15      NEXTC
        0004  R   00C7
14      0005      ED20             LDI,2          1                IS ALARM STATUS = TO 1?
        0006  A   0001
15      0007      E126             SUM,2,6        U.AST
        0008  X   0003
16      0009      7D22             TRRB,2,2       $+3              ..NO, GO TO NEXT CHAN
        000A  R   000C
17      000B      F705             HOP,LOOK
18      000C      E820             ADI,2          #6               NEW ONSET?
        000D  A   0006
19      000E      7D22             TRRB,2,2       NEXTC
        000F  R   00C7
20      0010      E7E0       LOOK  BLM,14         U:GET
        0011  R   00EB
21      0012      F700             BRU            NEXTC            NO POINTS, NEXT CHANNEL
        0013  R   00C7
22      0014      6D56             TRR,5,6
23      0015      2D51             LLS,5,1                         D.P. CHAN POINTER
24      0016      E526             LDM,2,6        U.TRF
        0017  R   0147
25      0018      E70A             BRU*,2         JMPTB
        0019  R   001A
26      001A  R   001F       JMPTB DFC            TRF0             U.TRF=0
27      001B  R   0024             DFC            TRF1                  =1
28      001C  R   00CE             DFC            TRF2                  =2
29      001D  R   00E5             DFC            TRF3                  =3
30      001E  R   00C7             DFC            NEXTC                 =4
31                           * U.TRF=0, SO WE'RE LOOKING FOR THE FIRST POINT, AND SINCE
32                           *   U.CPC ISN'T ZERO, WE HAVE IT IN R11, TIME IN R12,13.
33                           * NOW, SOME HOUSEKEEPING, THEN ON TO THE INTERESTING STUFF.
34      001F      6C22       TRF0  ZRR,2
35      0020      E626             STM,2,6        TRCNT            RESET TRCNT=0
        0021  R   0155
36      0022      F700             BRU            INCTR
        0023  R   002D
37                           * U.TRF=1, SO WE HAVE THE FIRST POINT IN TRBUF AND THE SECOND IN
```

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                        *   R12.  WE'LL COMPARE THESE TO DETERMINE THE DIRECTION OF THE
                        *   POSSIBLE ONSET.
                        * IF THE SECOND POINT > FIRST, SET U.TRF=3 (RETARD)
                        *  OTHERWISE, SET U.TRF=2 (ADVANCE).
0024      E740          TRF1  BLM,4          STPON          STORE POSSIBLE ONSET
0025  R   0129
0026      6D1B                TRR,1,11                     GET CURRENT VALUE
0027      E11E                SUM*,1,6       TRBFP         SUBTRACT ONSET VALUE
0028  R   0307
0029      7610                TBRB,1,0       INCTR
002A  R   002D
002B      80F6                ABMM,15,6      U.TRF         SET TRFLAG=3
002C  R   0147
002D      80F6          INCTR ABMM,15,6      U.TRF         SET TRFLAG=2
002E  R   0147
                        * STORE CURRENT POINT AND TIME IN TRBUF....
002F      ED30          STRTR LDI,3          3
0030  A   0003
0031      A026                MPM,2,6        TRCNT
0032  R   0155
0033      E036                ADM,3,6        TRBFP         R3=NEXT LOC IN TRBUF FOR THIS CHAN
0034  R   0307
0035      FEB3                STX,11,3                     STORE VALUE
0036      603F                ABR,3,15
0037      FEC3                STX,12,3                     STORE HI-TIME WORD
0038      603F                ABR,3,15
0039      FED3                STX,13,3
003A      80F6                ABMM,15,6      TRCNT         INCRM TRCNT
003B  R   0155
                        * ANOTHER POINT IN OUR POSSIBLE TRIGGER HAS BEEN SAFELY TUCKED IN.
                        *   NOW, LET'S SEE IF WE HAVE TRLIM OF THEM YET.....
003C      E526                LDM,2,6        TRCNT
003D  R   0155
003E      E126                SUM,2,6        U.TRL
003F  R   0315
0040      7D22                TRRB,2,2       NEXTP         NOT ENOUGH YET, GET ANOTHER
0041  R   0001
                        * ONSET IS GETTING MORE LIKELY.  WE HAVE TRLIM POINTS IN THE SAME
                        *   DIRECTION.  NOW, IF THEY FALL WITHIN TRTIM SECONDS, WE HAVE
                        *   A REAL HONEST-TO-GOODNESS TRIGGER.
                        * FIRST, GET THE POSSIBLE ONSET TIME INTO U.DTM
0042      ED30                LDI,3          U.DTM
0043  X   0013
0044      E525                LDM,2,5        PONST
0045  R   0323
0046      FE23                STX,2,3
0047      603F                ABR,3,15
0048      E525                LDM,2,5        PONST+1
0049  R   0324
004A      FE23                STX,2,3                      SET U.DTM WITH POSS. ONSET TIME
```

```
 73   004B     E6C0        STM,12        TEMP
      004C  R  033F
 74   004D     E6D0        STM,13        TEMP1
      004E  R  0340
 75   004F     6D46        TRR,4,6                     HOLD CHANNEL REGISTER
 76   0050     ED60        LDI,6         14            POINT TO U.DTM
      0051  A  000E
 77   0052     E7E0        BLM,14        E:DIF         RETURN WITH
      0053  X  0005
 78   0054  R  033F        DEC           TEMP           R12,13=TIME DIFFERENCE
 79   0055     6600        NOP
 80   0056     6600        NOP
 81   0057     6D64        TRR,6,4                     RESTORE CHANNEL REGISTER
 82   0058     E1D0        SUM,13        TRTIM
      0059  R  0341
 83   005A     76D0        TBRB,13,0     GUDTR         BRU IF TIME<TRTIM
      005B  R  007C
 84   005C     E536        LDM,3,6       TRCNT
      005D  R  0155
 85   005E     613F        SBR,3,15                    DECRIMENT COUNT
 86   005F     E636        STM,3,6       TRCNT
      0060  R  0155
 87   0061     ED40        LDI,4         3
      0062  A  0003
 88   0063     2024        MPR,2,4                     WORDS TO BE TRANSFERED
 89   0064     6F43        TTR,4,3                     R4=-WORD COUNT
 90   0065     E526        LDM,2,6       TRBFP         R2=STORE LOCATION
      0066  R  0307
 91   0067     6D32        TRR,3,2
 92   0068     E830        ADI,3         3             R3=LOAD LOCATION
      0069  A  0003
 93   006A     FD13  LOOP1 LDX,1,3                     MOVE FIRST VALUE OUT
 94   006B     FE12        STX,1,2                      AND REST UP ONE
 95   006C     602F        ABR,2,15
 96   006D     603F        ABR,3,15
 97   006E     704F        ABRB,4,15     LOOP1
      006F  R  006A
 98   0070     E536        LDM,3,6       TRBFP         SET UP FOR NEW PONST
      0071  R  0307
 99   0072     E830        ADI,3         3
      0073  A  0003
100   0074     603F        ABR,3,15
101   0075     FDC3        LDX,12,3
102   0076     603F        ABR,3,15
103   0077     FDD3        LDX,13,3
104   0078     E740        BLM,4         STPCN         GET NEW PONST
      0079  R  0129
105   007A     E700        BRU           NEXTP
      007B  R  0001
106                   * HOLY COW (SAINTLY BOVINE?), WE HAVE AN ONSET ON THE CHAN IN R6
```

```
107     007C     E546  GUDTR LDM,4,6       U.AST
        007D  X  0003
108     007E      714F       SBRB,4,15     $+4
        007F  R  0082
109     0080     E700       BRU           GOODY          INITIAL ONSET
        0081  R  0092
110                       * THE ONSET WE HAVE JUST FOUND TERMINATES A SIGNAL
111                       *   ALREADY IN PROGRESS, BUT PAST ITS HALF RECOVERY
112                       *   POINT.
113                       * WE'LL HAVE TO TERMINATE PROCESSING ON THAT SIGNAL
114                       *   BEFORE WE CAN TAKE UP THIS NEW POSSSIBILITY.
115     0082     6542       LBR,4,2
116     0083     E646       STM,4,6       U.END          FLAG END TYPE
        0084  X  0014
117     0085     E7F0       BLM,15        U:RP2          CUT OLD SIG OFF
        0086  X  0015
118     0087     6C44       ZRR,4                        CLEAR PARMS FOR NEW SIGNAL
119     0088     E646       STM,4,6       U.END
        0089  X  0014
120     008A     E646       STM,4,6       U.CLS
        008B  X  0016
121     008C     E546       LDM,4,6       U.LTF
        008D  X  0017
122     008E     E646       STM,4,6       U.FAC
        008F  X  0018
123     0090     E700       BRU           GOOD1
        0091  R  009A
124     0092     E546  GOODY LDM,4,6      U.DIU
        0093  X  0008
125     0094     E646       STM,4,6       U.ODI          ONSET DIURNAL=U.DIU
        0095  X  000C
126     0096     E546       LDM,4,6       U.SIG
        0097  X  0012
127     0098     E646       STM,4,6       U.OSG
        0099  X  0011
128     009A     E546  GOOD1 LDM,4,6      U.TRF
        009B  R  0147
129     009C     E646       STM,4,6       U.AST          SET U.AST=U.TRF
        009D  X  0003
130     009E     654D       LBR,4,13
131     009F     E646       STM,4,6       U.TRF          RESET U.TRF=4
        00A0  R  0147
132     00A1     E546       LDM,4,6       U.AMP
        00A2  X  0009
133     00A3     E646       STM,4,6       U.OAM          ONSET AMP=U.AMP
        00A4  X  000A
134     00A5     E546       LDM,4,6       TRBFP
        00A6  R  0307
135     00A7     FD34       LDX,3,4
136     00A8     E636       STM,3,6       U.OFZ          ONSET PHASE
```

```
        00A9  X  000D
137     00AA     E536        LDM,3,6       U.LFZ
        00AB  X  0019
138     00AC     E636        STM,3,6       U.CDT          CANDIDATE PEAK
        00AD  X  0007
139     00AE     604D        ABR,4,13
140     00AF     FD34        LDX,3,4
141     00B0     E635        STM,3,5       U.OTB          ONSET TIME, BCD
        00B1  X  000F
142     00B2     E535        LDM,3,5       U.LTM
        00B3  X  001A
143     00B4     E635        STM,3,5       U.CDM
        00B5  X  0008
144     00B6     E535        LDM,3,5       PONST
        00B7  R  0323
145     00B8     E635        STM,3,5       U.OTM          ONSET TIME, BINARY
        00B9  X  000E
146     00BA     604F        ABR,4,15
147     00BB     605F        ABR,5,15
148     00BC     FD34        LDX,3,4
149     00BD     E635        STM,3,5       U.OTB
        00BE  X  000F
150     00BF     E535        LDM,3,5       U.LTM
        00C0  X  001A
151     00C1     E635        STM,3,5       U.CDM
        00C2  X  0008
152     00C3     E535        LDM,3,5       PONST
        00C4  R  0323
153     00C5     E635        STM,3,5       U.CTM
        00C6  X  000E
154                       * GO ON TO NEXT CHANNEL
155     00C7     606F     NEXTC ABR,6,15
156     00C8     ED50        LDI,5         14
        00C9  A  000E
157     00CA     7956        SURB,5,6      NEXTP          LOOP THROUGH 14 CHANNELS
        00CB  R  0001
158     00CC     E700        BRU           U:WFA          THEN DO WAVE FORM ANALYSIS
        00CD  X  0006
159                       * IF U.TRF=2 WE ARE WORKING ON AN ADVANCE ONSET.  IF THE CURRENT
160                       *   POINT CONTINUES THE TREND, C'EST GRAND.  OTHERWISE, SAVE THE
161                       *   LAST POINT AS THE POSSIBLE START OF A NEW ONSET AND TAKE
162                       *   IT FROM THERE.
163     00CE     E7E0     TRF2  BLM,14        FZDIF
        00CF  R  0139
164     00D0     E700        BRU           $+4            CUR>LAST VAL, CONTINUE
        00D1  R  00D4
165     00D2     E700        BRU           STRTR          CUR<LAST VAL
        00D3  R  002F
166     00D4     E546     TRRST LDM,4,6       TRBFP            RESET TRIGGER
        00D5  R  0307
```

```
167   00D6     ED70        LDI,7          -3                MOVE LAST VALUE....
      00D7  A  FFFD
168   00D8     FD23  LOOP2 LDX,2,3                          TO FIRST!
169   00D9     FE24        STX,2,4
170   00DA     603F        ABR,3,15
171   00DB     604F        ABR,4,15
172   00DC     707F        ABRB,7,15      LOOP2
      00DD  R  00D8
173   00DE     652F        LBR,2,15                      RESET
174   00DF     E626        STM,2,6        U.TRF           U.TRF=1
      00E0  R  0147
175   00E1     E626        STM,2,6        TRCNT           TRCNT=1
      00E2  R  0155
176   00E3     E700        BRU            TRF1
      00E4  R  0024
177                    * IF U.TRF=3 WE ARE WORKING ON A RETARD ONSET.  IF THE CURRENT
178                    *   POINT CONTINUES IN THAT DIRECTION, C'EST MAGNIFIQUE.
179                    *   OTHERWISE, SAVE THE LAST POINT AS THE POSSIBLE ONSET AND
180                    *   TAKE IT FROM THERE.
181   00E5     E7E0  TRF3  BLM,14         FZDIF
      00E6  R  0139
182   00E7     E700        BRU            STRTR           GOOD POINT!
      00E8  R  002F
183   00E9     E700        BRU            TRRST           BAD POINT!
      00EA  R  00D4
```

```
                    ***********************************************************
                    * U:GET IS A DUAL-RETURN SUBROUTINE WHICH:
                    *  1.  CHECKS TO SEE OF ANY COMPRESSED POINTS ARE HELD
                    *  2.  IF ANY ARE, IT RETURNS THE NEXT ONE.
                    * CALLING SEQUENCE:
                    *     BLM,14        U:GET  (CHAN IN R6)
                    *    (RETURN IF NO COMPRESSED POINTS)
                    *    (RETURN IF THERE ARE COMPRESSED POINTS)
                    * RETURN WITH POINTS IN R11, ITS TIME IN R12,13
00EB      A510  U:GET SFM,1         GETSV          SAVE REGISTERS
00EC  R   0114
00ED      E526        LDM,2,6       U.CPC          GET COMP. POINT COUNTER
00EE  X   0001
00EF      7D22        TRRB,2,2      $+4            EXIT IF COUNT=0
00F0  R   00F3
00F1      E700        BRU           GETO1
00F2  R   0110
00F3      ED30        LDI,3         3              TAKE OUT COUNTER
00F4  A   0003
00F5      A026        MPM,2,6       GETCN           *3
00F6  R   011B
00F7      E036        ADM,3,6       U.CPP           +OFFSET
00F8  X   0002
00F9      FDB3        LDX,11,3                     GET POINT
00FA      603F        ABR,3,15
00FB      FDC3        LDX,12,3                     GET HI-TIME WORD
00FC      603F        ABR,3,15
00FD      FDD3        LDX,13,3                     GET LOW-TIME WORD
00FE      60EE        ABR,14,14                    MOVE RETURN ADDRESS
00FF      80F6        ABMM,15,6      GETCN         MOVE OUT COUNTER
0100  R   011B
0101      ED30        LDI,3          -1
0102  A   FFFF
0103      C036        ADMM,3,6       U.CPC         DECREM. COMP.POINT COUNTER
0104  X   0001
0105      E6B6        STM,11,6       U.LFZ         SAVE LAST POINT
0106  X   0019
0107      2D61        LLS,6,1
0108      E6C6        STM,12,6       U.LTM
0109  X   001A
010A      606F        ABR,6,15
010B      E6D6        STM,13,6       U.LTM
010C  X   001A
010D      A410  GETRT LFM,1          GETSV         RESTORE REGISTERS
010E  R   0114
010F      FF0E        BRX,14                       AND RETURN
0110      F626  GETO1 STM,2,6        GETCN         RESET OUT-COUNTER
0111  R   011B
0112      E700        BRU            GETRT
0113  R   010D
```

```
 219     0114          GETSV RES          7
 220     011B   A  0000 GETCN RES          14,0
```

```
                        ****************************************************************
                        * STPON TAKES THE INPUT FORMATTED TIME IN R12,13 AND STORES
                        *   THE BINARY EQUIVALENT IN PONST FOR THE CURRENT CHANNEL
 0129      E6C0   STPON STM,12          TEMP          STORE POSSIBLE ONSET
 012A  R   033F
 012B      E6D0        STM,13          TEMP1           TIME IN TEMP STORAGE
 012C  R   0340
 012D      E7E0        BLM,14          E:COT
 012E  X   0004
 012F  R   033F        DFC             TEMP
 0130      E6C5        STM,12,5        PONST         BINARY POSSIBLE ONSET TIME
 0131  R   0323
 0132      E6D5        STM,13,5        PONST+1
 0133  R   0324
 0134      E5C0        LDM,12          TEMP          RESTORE R12,13
 0135  R   033F
 0136      E5D0        LDM,13          TEMP1
 0137  R   0340
 0138      FF04        BRX,4
```

```
                    ***********************************************************************
                    * FZDIF COMPUTES THE DIFFERENCE IN PHASE BETWEEN THE CURRENT
                    *   VALUE IN (R11) AND THE LAST VALUE STORED IN TRBUF.
                    * IF CUR.VAL.>LAST VAL., USE 1ST RETURN
                    *   OTHERWISE USE THE 2ND RETURN
                    * CALLING SEQUENCE.....
                    *     BLM,14          FZDIF (R6=CHAN,R11=CURRENT VALUE)
                    *    (RETURN LOCATION IF CUR.VAL.>LAST VAL.)
                    *    (RETURN OTHERWISE)
 0139     E536  FZDIF LDM,3,6         TRCNT
 013A  R  0155
 013B     613F        SBR,3,15
 013C     ED40        LDI,4           3
 013D  A  0003
 013E     2024        MPR,2,4
 013F     E036        ADM,3,6         TRBFP          R3=ADDR OF LAST PHASE VALUE
 0140  R  0307
 0141     FD23        LDX,2,3                        R2=LAST PHASE VALUE
 0142     692B        SUR,2,11                       R2=LAST VAL.-CUR.VAL.
 0143     7620        TBRB,2,0        $+3            BRU IF CUR>LAST VALUE
 0144  R  0146
 0145     60EE        ABR,14,14                      INC. RETURN IF LAST>CUR VAL
 0146     FF0E        BRX,14                         RETURN
```

```
                    ***************************************************************
                    * U.TRF IS THE TRIGGER STATUS FLAG. IT IS INTERPRETED:
                    *   0 LOOKING FOR ONSET (FIRST POINT)
                    *   1 LOOKING FOR SECOND POINT IN EITHER DIRECTION
                    *   2 LOOKING FOR ADDITIONAL POINTS (ADVANCED DIRECTION)
                    *   3 LOOKING FOR ADDITIONAL POINTS (RETARD DIRECTION)
                    *   4 VALID ONSET
0147  A  0000       U.TRF RES           14,0
                    ***************************************************************
                    * TRCNT IS A COUNTER OF POINTS IN THE TRIGGER BUFFER
0155  A  0000       TRCNT RES           14,0
                    ***************************************************************
                    * TRBUF IS A 14 CHANNEL * 3 WORD/ENTRY * 10 ENTRY BUFFER OF POSSIBLE
                    *   POINTS LEADING TO A VALID TRIGGER.
                    * TRBFP IS A CHAN BY CHAN TABLE OF STARTING POINTS.
0163  A  0000       TRBUF RES           420,0
0307  R  0163       TRBFP DFC           TRBUF          CHAN 0
0308  R  0181             DFC           TRBUF+30       CHAN 1
0309  R  019F             DFC           TRBUF+60       CHAN 2
030A  R  01BD             DFC           TRBUF+90       CHAN 3
030B  R  01DB             DFC           TRBUF+120      CHAN 4
030C  R  01F9             DFC           TRBUF+150      CHAN 5
030D  R  0217             DFC           TRBUF+180      CHAN 6
030E  R  0235             DFC           TRBUF+210      CHAN 7
030F  R  0253             DFC           TRBUF+240      CHAN 8
0310  R  0271             DFC           TRBUF+270      CHAN 9
0311  R  028F             DFC           TRBUF+300      CHAN 10
0312  R  02AD             DFC           TRBUF+330      CHAN 11
0313  R  02CB             DFC           TRBUF+360      CHAN 12
0314  R  02E9             DFC           TRBUF+390      CHAN 13
                    ***************************************************************
                    * TRLIM IS THE MUMBER OF POINTS REQUIRED FOR A VALID TRIGGER
0315  A  0005       U.TRL RES           14,5
                    ***************************************************************
                    * PCNST IS THE BINARY TIME FOR THE FIRST POINT IN TRBUF (EACH CHAN)
0323  A  0000       PCNST RES           28,0
                    ***************************************************************
033F  A  0000       TEMP  DFC           0              TEMPORARY STORAGE
0340  A  0000       TEMP1 DFC           0
                    ***************************************************************
                    * TRTIM IS THE MAXIMUM PERMISSIBLE TIME BETWEEN FIRST AND LAST POINT
                    *  IN THE TRIGGER SEQUENCE.  (TIME IN SECONDS).
0341  A  001E       TRTIM DFC           30
                    ***************************************************************
0342                      END

TOTAL ASSEMBLY ERRORS =   0    SIZE =   834
```

```
*****WARNING*** **0**  015B   CURRENT DIURNAL TO ONSET VALUE.
*****WARNING*** **0**  0184        PASS, SET CLASS = 2
*****WARNING*** **0**  0188        PASS, SET CLASS = 2          CK. CLASS 2 OFFSET CRITERIA).*******
*****WARNING*** **0**  018A         REASN
```

```
                          PGM          U$WFA
                           INT          U:WFA,U.LFZ,U.LTM,U.CDT,U.CDM
                           INT          U.CCL
                           EXT          U.CST,U.AST,U.SLP,U.DIU,U.FAC
                           EXT          U:RP1,U:RP2,U:GET,E:DIF,U.CTM
                           EXT          U.CLS,W.PFZ,W.PTM,W.PAM,W.OST
                           EXT          W.ONR,W.LPK,W.LTM,W.VPK,W.VTM
                           EXT          W.RFZ,W.RTM,W.RAM,E:SKD,U.END
                           EXT          U.OFZ,U.ODI,U.BGF,U.TRK,U.ODR
                           EXT          E:COT,U.OTM,E.IOF,U.LTF,E:035
                           EXT          E:FRT,U.AMP,U.DTM,W.LAM,W.VAM
                           EXT          U.FRQ,U.TRF,U.TRL
                      *     CAT NO.  400100-006
                      * U$WFA PERFORMS WAVEFORM ANALYSIS ON A POSSIBLE SIGNAL WHICH
                      *   WAS DETECTED BY U$TGR.
0000      6C66        U:WFA ZRR,6                          R6=CHANNEL
0001      86D6        LOOP1 TBMB,13,6      U.CST,DIED       IS CHAN DOWN?
0002  X   0001
0003  R   0026
0004      E526              LDM,2,6        U.AST            NO, CHECK U.AST
0005  X   0002
0006      612F              SBR,2,15
0007      7620              TBRB,2,0       WFA1            U.AST=0
0008  R   000D
0009      7D22              TRRB,2,2       WFA2            U.AST>1
000A  R   0053
000B      E700              BRU            UPDIU           U,AST=1
000C  R   0014
000D      652F        WFA1  LBR,2,15                       JUST UP, INITIATE THINGS AND STUFF
000E      E626              STM,2,6        U.AST            SET U.AST=1
000F  X   0002
0010      E526              LDM,2,6        U.SLP
0011  X   0003
0012      E626              STM,2,6        U.DIU            U.DIU=U.SLP
0013  X   0004
                      * THE DIURNAL SLOPE ESTIMATE IS UPDATED THUS:
                      * U.DIU=U.DIU+U.FAC*(U.SLP-U.DIU)
0014      E536        UPDIU LDM,3,6        U.SLP
0015  X   0003
0016      E136              SUM,3,6        U.DIU
0017  X   0004
0018      A026              MPM,2,6        U.FAC
0019  X   0005
001A      2E21              LAD,2,1
001B      C026              ADMM,2,6       U.DIU
001C  X   0004
001D      E7F0        NEXTC BLM,15         SCMPD            CLEAR C.P. BUFFER
001E  R   032F
001F      606F              ABF,6,15                        NEXT CHANNEL
0020      ED50              LDI,5          14
```

```
          0021  A  000E
   37     0022     7956        SURB,5,6      LOOP1
          0023  R  0001
   38                      * ALL U-ANALYSIS IS DONE FOR THIS TEN SECOND PERIOD,
   39                      * RETURN TO THE SCHEDULER AND WAIT, WE'LL BE BACK.
   40                      *      SEE Y'ALL LATER
   41     0024     E700        BRU           E:SKD
          0025  X  0018
```

```
                        * THE CHANNEL IS DOWN.  IF WE HAVE A WAVEFORM IN THE ADVANCED
                        *   STAGES, I.E. U.AST IS 7 OR 8, REPORT THE WAVE, QUALIFYING
                        *   THE REPORT WITH A CHANNEL DOWN STATEMENT.  IN ANY CASE,
                        *   ENSURE THAT U.AST=0 AND GO TO THE NEXT CHANNEL.
0026        E526  DIED  LDM,2,6       U.AST
0027    X   0002
0028        E920        SUI,2         6
0029    A   0006
002A        7620        TBRB,2,0      RSTAS         U.AST<6
002B    R   0047
002C        7D22        TRRB,2,2      DAST7         U.AST=7
002D    R   0043
002E        E536        LDM,3,6       U.LFZ         SET UP CURRENT VALUES
002F    R   0337
0030        E636        STM,3,6       W.RFZ          AS HALF RECOVERY
0031    X   0015
0032        E536        LDM,3,6       U.AMP          VALUES.
0033    X   0025
0034        E636        STM,3,6       W.RAM
0035    X   0017
0036        6D56        TRR,5,6
0037        2D51        LLS,5,1
0038        E535        LDM,3,5       U.LTM
0039    R   0345
003A        E635        STM,3,5       W.RTM
003B    X   0016
003C        605F        ABR,5,15
003D        E535        LDM,3,5       U.LTM
003E    R   0345
003F        E635        STM,3,5       W.RTM
0040    X   0016
0041        E7F0        BLM,15        U:RP1         U.AST=6,END SIGNAL THERE
0042    X   0006
0043        8206  DAST7 OBMM,0,6      U.END         SET ABNORMAL END BIT
0044    X   0019
0045        E7F0        BLM,15        U:RP2         END SIGNAL COMPLETELY
0046    X   0007
0047        6C22  RSTAS ZRR,2
0048        E626        STM,2,6       U.AST         RESET U.AST=0
0049    X   0002
004A        6D56        TRR,5,6
004B        2D51        LLS,5,1                     D.P. CHAN POINTER
004C        E625        STM,2,5       U.OTM         RESET ONSET TIME
004D    X   0020
004E        605F        ABR,5,15
004F        E625        STM,2,5       U.OTM         IN TWO PARTS
0050    X   0020
0051        E700        BRU           NEXTC
0052    R   001D
```

```
                    ***********************************************************************
                    * U.AST INDICATES THE STATE OF THE WAVEFORM.
                    *   GO TO THE ROUTINE CORRESPONDING TO THAT STATE.......
     0053     E526  WFA2  LDM,2,6       U.AST
     0054   X 0002
     0055     E70A        BRU*,2        JMPTB-2
     0056   R 0055
     0057   R 005D  JMPTB DFC            UAST2
     0058   R 0099        DFC            UAST3
     0059   A 0000        DFC            0                (ILLEGAL VALUE)
     005A   R 01A5        DFC            UAST5
     005B   R 01F0        DFC            UAST6
     005C   R 02A2        DFC            UAST7
```

```
                        ***********************************************************************~
                        * WHEN U.AST=2, WE HAVE FOUND AN ONSET IN THE ADVANCE DIRECTION.
                        *   AS LONG AS PHASE VALUES DECREASE, WE KEEP TRACKING. WHEN
                        *   TWO SUCCESSIVE COMPRESSED POINTS SHOW A CHANGE, THE MINIMAL
                        *   POINT IS CONSIDERED PEAK.
                        * IF NO PEAK IS FOUND WITHIN T1 SECONDS, THE ONSET AND SIGNAL
                        *   ARE REJECTED.
005D      6D56  UAST2 TRR,5,6
005E      2D51        LLS,5,1
005F      E7E0        BLM,14        U:GET
0060  X   0008
0061      F700        BRU           AST21         NO COMP. POINTS
0062  R   008E
0063      E526        LDM,2,6       U.CDT         IS CUR.POINT<CDATE
0064  R   0361
0065      692B        SUR,2,11
0066      612F        SBR,2,15                    (DON'T UPDATE ON =)
0067      7620        TBRB,2,0      AST22         NO,CHECK DELAY COUNT
0068  R   0084
0069      E6B6        STM,11,6      U.CDT         YES,NEW CANDIDATE FOR PEAK
006A  R   0361
006B      E6C5        STM,12,5      U.CDM           AND ITS TIME
006C  R   036F
006D      E6D5        STM,13,5      U.CDM+1
006E  R   0370
006F      6C22        ZRR,2
0070      E626        STM,2,6       CFIRM         RESET DELAY COUNTER
0071  R   0399
0072      E6C0  AST23 STM,12        TEMP          CURRENT POINT TIME
0073  R   03A7
0074      E6D0        STM,13        TEMP+1
0075  R   03A8
0076      E7E0        BLM,14        E:DIF
0077  X   0009
0078  R   03A7        DFC           TEMP
0079      6600        NOP                          ONSET TIME SHOULD
007A      6600        NOP                           NEVER = 0
007B      E1D0        SUM,13        T1
007C  R   03AA
007D      76D0        TBRB,13,0     UAST2+2       NEXT POINT IF TIME<T1
007E  R   005F
007F      652F  SREA1 LBR,2,15                    SET REASN=1
0080      E626        STM,2,6       REASN
0081  R   03D4
0082      E700        BRU           FAIL
0083  R   02EF
0084      80F6  AST22 ABMM,15,6     CFIRM         INC. CONFIRMATION
0085  R   0399
0086      ED20        LDI,2         4
0087  A   0004
```

```
119     0088      E126        SUM,2,6       CFIRM
        0089  R   0399
120     008A      7D22        TRRB,2,2      AST23         IF CONFIRMATION IS MADE
        008B  R   0072
121     008C      E700        BRU           PVALC         GO CHECK PEAK VALIDITY
        008D  R   00DF
122     008E      E7E0  AST21 BLM,14        E:DIF         NO POINTS AVAILABLE
        008F  X   0009
123     0090  X   000A        DFC           U.CTM         HOW LONG SINCE ONSET?
124     0091      6600        NOP                         ONSET NEVER=0 HERE
125     0092      6600        NOP                               ?
126     0093      E1D0        SUM,13        T1
        0094  R   03AA
127     0095      76D0        TBRB,13,0     UPDIU         NOT > T1 YET.
        0096  R   0014
128     0097      E700        BRU           SREA1
        0098  R   007F
```

```
                        ****************************************************************
                        * WHEN U.AST=3, WE HAVE FOUND AN ONSET IN THE RETARD DIRECTION.
                        *   PEAK IS OBTAINED THE SLOPE BETWEEN ONSET AND A CANDIDATE
                        *   PEAK VALUE EXCEEDS THREE SUCCESSIVE COMPUTED SLOPES FROM
                        *   ONSET TO THE THEN CURRENT POINT.
                        * IF NO PEAK IS FOUND WITHIN T1 SECONDS, THE ONSET AND SIGNAL
                        *   ARE REJECTED.
 0099      6D56  UAST3 TRR,5,6
 009A      2D51        LLS,5,1                     D.P.CHAN POINTER
 009B      E7E0        BLM,14        U:GET
 009C  X   0008
 009D      E700        BRU           AST21         NO COMP. POINTS
 009E  R   008E
 009F      E6C0        STM,12        TEMP          COMPUTE SLOPE IF CFIRM=0
 00A0  R   03A7
 00A1      E6D0        STM,13        TEMP+1        SAVE CURRENT TIME....
 00A2  R   03A8
                       * CUR. SLOPE=(CUR. FAZ-U.OFZ)/(CUR. TIME-U.OTM)
 00A3      E7E0        BLM,14        E:DIF
 00A4  X   0009
 00A5  R   03A7        DFC           TEMP
 00A6      6600        NOP                         ONSET TIME
 00A7      6600        NOP                          NOT 0.
 00A8      6D3B        TRR,3,11                     CURRENT PHASE
 00A9      E136        SUM,3,6       U.OFZ          CUR. PHASE-U.OFZ
 00AA  X   001A
 00AB      6C22        ZRR,2
 00AC      212D        DVR,2,13
                       * FIND THE MAXIMUM SLOPE AS |SLOPE|
                       *   COMPARE CURRENT SLOPE FROM ONSET TO CURRENT MAX.
 00AD      6D23        TRR,2,3
 00AE      E126        SUM,2,6       SLOPE
 00AF  R   038B
 00B0      7620        TBRB,2,0      AST35          NOT NEW MAX
 00B1  R   00B6
                       * WE HAVE A NEW MAXIMUM SLOPE
 00B2      E636        STM,3,6       SLOPE
 00B3  R   038B
 00B4      E700        BRU           AST32
 00B5  R   00BF
                       * WE'LL CALL IT A PEAK WHEN THE CURRENT SLOPE RELAXES
                       *   BY 25 PERCENT FROM THE MAX.
 00B6      E5F6  AST35 LDM,15,6      SLOPE
 00B7  R   038B
 00B8      ED20        LDI,2         #6000          =.75
 00B9  A   6000
 00BA      20E2        MPR,14,2
 00BB      2EE1        LAD,14,1
 00BC      693E        SUR,3,14
 00BD      7630        TBRB,3,0      AST33          BRU IF CONFIRMING PEAK
```

```
        00BE  R  00D7
168                     * NOT YET CONFIRMING PEAK SAVE NEW CANDIDATE
169     00BF     E6B6  AST32 STM,11,6      U.CDT          NEW PEAK CANDIDATE
        00C0  R  0361
170     00C1     E5D0        LDM,13        TEMP
        00C2  R  03A7
171     00C3     E6D5        STM,13,5      U.CDM          ITS TIME
        00C4  R  036F
172     00C5     E5D0        LDM,13        TEMP+1
        00C6  R  03A8
173     00C7     E6D5        STM,13,5      U.CDM+1
        00C8  R  0370
174     00C9     6CDD        ZRR,13
175     00CA     E6D6        STM,13,6      CFIRM          RESET CFIRM=0
        00CB  R  0399
176     00CC     E7E0  AST34 BLM,14        E:DIF
        00CD  X  0009
177     00CE  R  03A7        DFC           TEMP
178     00CF     6600        NOP
179     00D0     6600        NOP
180     00D1     E1D0        SUM,13        T1
        00D2  R  03AA
181     00D3     76D0        TBRB,13,0     UAST3+2        NEXT POINT IF TIME<T1
        00D4  R  009B
182     00D5     E700        BRU           SREA1
        00D6  R  007F
183     00D7     80F6  AST33 ABMM,15,6     CFIRM          INC CFIRM COUNTER
        00D8  R  0399
184     00D9     F536        LDM,3,6       CFIRM
        00DA  R  0399
185     00DB     E930        SUI,3         4
        00DC  A  0004
186     00DD     7D33        TRRB,3,3      AST34          IF CFIRM NOT=3, CONTINUE
        00DE  R  00CC
```

```
                        ****************************************************************
                        * NOW WE HAVE BOTH AN ONSET AND A PEAK.  LET'S FIND OUT IF THE
                        *   PEAK IS VALID.  IF IT IS, WE'LL START LOOKING FOR RECOVERY
                        *   TO BEGIN, OTHERWISE WE'LL DROP THE WHOLE THING AND START
                        *   LOOKING FOR ANOTHER ONSET.
 00DF        6C22       PVALC ZRR,2
 00E0        E626             STM,2,6       CFIRM          RESET CFIRM
 00E1   R    0399
 00E2        E530             LDM,3         U.BGF          SET:
 00E3   X    001C
 00E4        E636             STM,3,6       U.FAC           U.FAC=U.BGF
 00E5   X    0005
 00E6        E536             LDM,3,6       U.CLS
 00E7   X    000B
 00E8        E930             SUI,3         3
 00E9   A    0003
 00EA        7D33             TRRB,3,3      PVAL1          CLASS NOT 3, BRU
 00EB   R    0103
 00EC        ED30             LDI,3         5              CLASS=3
 00ED   A    0005
 00EE        E636             STM,3,6       U.AST          SET U.AST=5
 00EF   X    0002
 00F0        E536             LDM,3,6       U.ODI
 00F1   X    001B
 00F2        E636             STM,3,6       U.DIU          U.DIU=U.ODI
 00F3   X    0004
 00F4        E536             LDM,3,6       U.CDT          REAL PEAK VALUES
 00F5   R    0361
 00F6        E636             STM,3,6       W.PFZ           W.PFZ=U.CDT
 00F7   X    000C
 00F8        E535             LDM,3,5       U.CDM
 00F9   R    036F
 00FA        E635             STM,3,5       W.PTM           W.PTM=U.CDM
 00FB   X    000D
 00FC        605F             ABR,5,15
 00FD        E535             LDM,3,5       U.CDM
 00FE   R    036F
 00FF        E635             STM,3,5       W.PTM
 0100   X    000D
 0101        E700             BRU           WFA2           MOVE ALONG
 0102   R    0053
                        * CLASS NOT 3, WHICH IMPLIES NORMAL ADVANCE OR RETARD
                        *   SIGNAL.  WE WILL NOW COMPUTE THE OFFSET AND ONSET
                        *   RATE.
                        * WHEN COMPUTING THE OFFSET, TAKE INTO ACCOUNT THE DIURNAL
                        *   AT ONSET.  TO DO THIS, USE THE FOLLOWING:
                        * W.OST=U.CDT-(U.CDM-U.OTM)*U.ODI-U.OFZ
                        * W.ONR=W.OST/(U.CDM-U.OTM)
 0103        E535       PVAL1 LDM,3,5       U.CDM
 0104   R    036F
```

```
220     0105     E630      STM,3        TEMP
        0106  R  03A7
221     0107     E535      LDM,3,5      U.CDM+1
        0108  R  0370
222     0109     E630      STM,3        TEMP+1
        010A  R  03A8
223     010B     E7E0      BLM,14       E:DIF
        010C  X  0009
224     010D  R  03A7      DFC          TEMP
225     010E     6600      NOP
226     010F     6600      NOP
227     0110     E6D0      STM,13       TEMP2          TEMP=(PEAK TIME-ONSET TIME)
        0111  R  03A9
228     0112     E536      LDM,3,6      U.ODI
        0113  X  001B
229     0114     20C3      MPR,12,3                    O.DIU*(U.CDM-U.OTM)
230     0115     ED30      LDI,3        480            SCALE
        0116  A  01E0
231     0117     21C3      DVR,12,3
232     0118     E536      LDM,3,6      U.CDT
        0119  R  0361
233     011A     693D      SUR,3,13
234     011B     E136      SUM,3,6      U.OFZ
        011C  X  001A
235     011D     7630      TBRB,3,0     $+3
        011E  R  0120
236     011F     F702      HOP,$+2
237     0120     6F33      TTR,3,3
238     0121     E636      STM,3,6      W.OST
        0122  X  000F
239     0123     EDC0      LDI,12       60             SCALE
        0124  A  003C
240     0125     202C      MPR,2,12
241     0126     A120      DVM,2        TEMP2
        0127  R  03A9
242     0128     E636      STM,3,6      W.ONR
        0129  X  0010
243                       * NOW THAT WE HAVE THE OFFSET AND ONSET RATE, WE'LL DETERMINE
244                       *   WHETHER THEY MEET REPORTING CRITERIA:
245                       * CLASS 1 SIGNAL:
246                       *   W.OST>POFF
247                       *   W.ONR>PONHI IF TRACK RATE>4
248                       *         >PONMD IF TRACK RATE=2, 3, OR 4
249                       *         >PONLO IF TRACK RATE=0 OR 1
250                       * CLASS 2 SIGNAL (ADVANCE ONLY):
251                       *   W.OST>SOFF
252                       *   W.ONR>SONRT
253     012A     E546      LDM,4,6      U.TRK
        012B  X  001D
254     012C     614E      SBR,4,14
```

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255     012D      7640        TBRB,4,0      LOTRK
        012E  R   0199
256     012F      E940        SUI,4         3
        0130  A   0003
257     0131      7640        TBRB,4,0      MDTRK
        0132  R   019F
258     0133      E130        SUM,3         PCNHI          CHECK HI TRACK RATE (CLASS1)
        0134  R   03AF
259     0135      7630        TBRB,3,0      CKSEC
        0136  R   016C
260     0137      E526  CKPOF LDM,2,6       W.CST          CHECK OFFSET RATE (CLASS1)
        0138  X   000F
261     0139      E120        SUM,2         POFF
        013A  R   03AE
262     013B      7620        TBRB,2,0      CKSEC
        013C  R   016C
263     013D      652F        LBR,2,15
264     013E      E626        STM,2,6       U.CLS          PASS, SET CLASS=1
        013F  X   000B
265                       * SIGNAL PASSES CLASS 1 CRITERIA.......
266     0140      E526  PASS  LDM,2,6       U.CDT
        0141  R   0361
267     0142      E626        STM,2,6       W.PFZ
        0143  X   000C
268     0144      E626        STM,2,6       W.VPK
        0145  X   0013
269     0146      E525        LDM,2,5       U.CDM
        0147  R   036F
270     0148      E625        STM,2,5       W.PTM
        0149  X   000D
271     014A      E625        STM,2,5       W.VTM
        014B  X   0014
272     014C      605F        ABR,5,15
273     014D      E525        LDM,2,5       U.CDM
        014E  R   036F
274     014F      E625        STM,2,5       W.PTM
        0150  X   000D
275     0151      E625        STM,2,5       W.VTM
        0152  X   0014
276     0153      E526        LDM,2,6       U.AMP
        0154  X   0025
277     0155      E626        STM,2,6       W.PAM
        0156  X   000E
278                       ****************************************************
279     0157      E626        STM,2,6       W.PAM ONLY):OR 1ERIA:(U.CDM-U.OTM)ET TIME)******* +
        0158  X   000E
280     0159      E626        STM,2,6       W.PAM ONLY):OR 1ERIA:(U.CDM-U.OTM)ET TIME)******* +
        015A  X   000E
281 D   015B      0000   CURRENT DIURNAL TO ONSET VALUE.
        015C  A   0000
```

```
282      015D     E526        LDM,2,6       U.ODI
         015E  X  001B
283      015F     E626        STM,2,6       U.DIU
         0160  X  0004
284      0161     E526        LDM,2,6       U.AST
         0162  X  0002
285      0163     612F        SBR,2,15
286      0164     E626        STM,2,6       U.ODR
         0165  X  001E
287      0166     ED20        LDI,2         5
         0167  A  0005
288      0168     E626        STM,2,6       U.AST          SET U.AST=5
         0169  X  0002
289      016A     E700        BRU           WFA2           CONTINUE
         016B  R  0053
290      016C     E546  CKSEC LDM,4,6       U.AST
         016D  X  0002
291      016E     714E        SBRB,4,14     SREA2          NO CLASS 2 ON RETARD SIGNAL
    U    016F  A  0000
292      0170     E526        LDM,2,6       W.OST
         0171  X  000F
293      0172     E120        SUM,2         SOFF           CK. CLASS 2 OFFSET CRITERIA
         0173  R  03B2
294      0174     7620        TBRB,2,0      SREA3
         0175  R  018E
295      0176     E526        LDM,2,6       W.ONR
         0177  X  0010
296      0178     E120        SUM,2
    A    0179  A  0000
297      017A     E526        LDM,2,6       W.ONR          CK. CLASS 2 OFFSET CRITERIA).*******
         017B  X  0010
298      017C     E526        LDM,2,6       W.ONR
         017D  X  0010
299      017E     E120        SUM,2         SONRT          CK. CLASS 2 ONSET RATE CRITERIA
         017F  R  03B3
300      0180     7620        TBRB,2,0      SREA4
         0181  R  0194
301      0182     E120        SUM,2         SONRT          CK. CLASS 2 ONSET RATE CRITERIA*** +
         0183  R  03B3
302 O    0184     0000        PASS, SET CLASS = 2
         0185  A  0000
303      0186     E700        BRU
    A    0187  A  0000
304 O    0188     0000        PASS, SET CLASS = 2            CK. CLASS 2 OFFSET CRITERIA).*******
         0189  A  0000
305 O    018A     0000         REASN
         018B  A  0000
306      018C     E700        BRU            FAIL
         018D  R  02EF
307      018E     ED20  SREA3 LDI,2          3
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```
        018F  A  0003
308     0190     E626        STM,2,6        REASN
        0191  R  03D4
309     0192     E700        BRU            FAIL
        0193  R  02EF
310     0194     652D  SREA4 LBR,2,13
311     0195     E626        STM,2,6        REASN
        0196  R  03D4
312     0197     E700        BRU            FAIL
        0198  R  02EF
313     0199     E130  LOTRK SUM,3          PONLO
        019A  R  03B1
314     019B     7630        TBRB,3,0       CKSEC
        019C  R  016C
315     019D     E700        BRU            CKPOF        PASS CLASS 1 ONSET  RATE
        019E  R  0137
316     019F     E130  MDTRK SUM,3          PONMD
        01A0  R  03B0
317     01A1     7630        TBRB,3,0       CKSEC
        01A2  R  016C
318     01A3     E700        BRU            CKPOF        PASS CLASS 1 ONSET RATE
        01A4  R  0137
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                        ***********************************************************************
                        * WHEN U.AST=5, WE HAVE A VALID PEAK TO OUR LITTLE SIGNAL.
                        *   THE NEXT STEP IS TO LOOK FOR IT TO BEGIN RECOVERING.
                        * AT PEAK WE RESET THE CURRENT DIURNAL ESTIMATE TO THE
                        *   ONSET ESTIMATE. AT THE SAME TIME WE SET U.FAC TO THE
                        *   BIG VALUE.  THIS REDUCES THE TIME CONSTANT IN THE
                        *   DIGITAL FILTER FOR DIURNAL UPDATES.  NOW, WHEN THE
                        *   CURRENT DIURANL SLIPS AROUND PAST THE ONSET VALUE
                        *   BY ALPHA, RECOVERY HAS BEGUN.
                        * ONLY ONE CATCH, THIS MUST OCCUR WITHIN T2 SECONDS OF
                        *   ONSET.
01A5      E7F0          UAST5 BLM,15        UAST4          GET RID OF COMPRESSED DATA.
01A6  R   02D8
01A7      E526                LDM,2,6       U.DIU          IS.......
01A8  X   0004
01A9      E126                SUM,2,6       U.ODI           (U.DIU-U.ODI)
01AA  X   001B
01AB      E120                SUM,2         ALPHA             -ALPHA>0?
01AC  R   03B6
01AD      7620                TBRB,2,0      AST51          BRU IF NOT
01AE  R   01E1
                        * RECOVERY HAS BEGUN
01AF      ED20                LDI,2         6
01B0  A   0006
01B1      E626                STM,2,6       U.AST          SET U.AST=6
01B2  X   0002
01B3      E526                LDM,2,6       U.ODR
01B4  X   001E
01B5      712F                SBRB,2,15     AST52
01B6  R   01BC
                        * IF DIRECTION=1 (ADVANCE SIGNAL),
                        *   SET MINIMUM RECOVERY (RCMIN)= 1/2 OFFSET
                        * IF DIRECTION=2 (RETARD SIGNAL)
                        *   SET RCMIN=1/2 (CYCLE-OFFSET)
                        *   WHERE CYCLE = 1/FREQUENCY
                        * OTHERWISE,
                        *   SET RCMIN = 7 MICROSECONDS
01B7      E536                LDM,3,6       W.OST
01B8  X   000F
01B9      2B31                RAS,3,1
01BA      E700                BRU           AST53+2
01BB  R   01DD
01BC      712F          AST52 SBRB,2,15     AST53
01BD  R   01DB
                        * CONVERT FREQUENCY TO BINARY
01BE      6D76                TRR,7,6
01BF      2D71                LLS,7,1
01C0      E557                LDM,5,7       U.FRQ
01C1  X   0029
01C2      E950                SUI,5         #3030
```

```
        01C3  A  3030
357     01C4     08D5        MBR,13,5                        R13=FREQ*10
358     01C5     ED40        LDI,4          #A
        01C6  A  000A
359     01C7     20C4        MPR,12,4                        TIMES 10
360     01C8     0C55        MLR,5,5
361     01C9     68D5        ADR,13,5                        +FREQ*1
362     01CA     20C4        MPR,12,4                        TIMES 10
363     01CB     607F        ABR,7,15
364     01CC     E557        LDM,5,7        U.FRQ
        01CD  X  0029
365     01CE     E950        SUI,5          #2E30
        01CF  A  2E30
366     01D0     68D5        ADR,13,5                        +FREQ*.1
367                       * CYCLE = 160000 / FREQ     (MICROSEC * 16)
368                       *  WHERE 160000 = #27100
369     01D1     652E        LBR,2,14
370     01D2     ED30        LDI,3          #7100
        01D3  A  7100
371     01D4     212D        DVR,2,13
372     01D5     E636        STM,3,6        CYCLE            SAVE CYCLE FOR FULL RECOVERY
        01D6  R  03C6
373                       * NOW COMPUTE RECOVERY MINIMUM
374     01D7     E136        SUM,3,6        W.OST            (CYCLE - OFFSET)
        01D8  X  000F
375     01D9     2B31        RAS,3,1                                 /2
376     01DA     F703        HOP,AST53+2
377     01DB     ED30  AST53 LDI,3          #70
        01DC  A  0070
378     01DD     E636        STM,3,6        RCMIN
        01DE  R  03B8
379     01DF     E700        BRU            UPDIU
        01E0  R  0014
380     01E1     E7E0  AST51 BLM,14         E:DIF
        01E2  X  0009
381     01E3  X  000A        DFC            U.CTM            HOW LONG SINCE ONSET
382     01E4     6600        NOP
383     01E5     6600        NOP
384     01E6     E1D0        SUM,13         T2
        01E7  R  03AB
385     01E8     76D0        TBRB,13,0      UPDIU            TIME O.K.
        01E9  R  0014
386     01EA     ED20        LDI,2          5                TOO LONG, DROP SIGNAL
        01EB  A  0005
387     01EC     E626        STM,2,6        REASN            SET REASON=5
        01ED  R  03D4
388     01EE     F700        BRU            FAIL
        01EF  R  02EF
```

```
                        ***********************************************************************
                        * WHEN U.AST=6, RECOVERY HAS BGUN.  THE MOST IMPORTANT
                        *   STEP FOLLOWS: DETERMINING A VALID RECOVERY.
                        * IF RECOVERY IS CONSIDERED COMPLETE (U.DIU RETURNS TO
                        *   WITHIN BETA OF U.ODI) IN LESS THAN T3, THE SIGNAL
                        *   IS REJECTED.  IF WE LAST T3 SECONDS INTO THE SIGNAL
                        *   WITHOUT COMPLETION, WE CHECK THE PROGRESS OF THE
                        *   RECOVERY.  IF WE RECOVER BY RCMIN FROM PEAK AND THE
                        *   RECOVERY RATE IS LESS THAN THE ONSET RATE, RECOVERY
                        *   IS VALID AND THE PEAK IS REPORTABLE.
  01F0      6D56  UAST6 TBR,5,6
  01F1      2D51        LLS,5,1
  01F2      E526        LDM,2,6       U.DIU          IS....
  01F3  X   0004
  01F4      E126        SUM,2,6       U.ODI          (U.DIU-U.ODI)
  01F5  X   001B
  01F6      E120        SUM,2         BETA              -BETA>0?
  01F7  R   0387
  01F8      7620        TBRB,2,0      $+4            BRU IF NOT
  01F9  R   01FC
  01FA      E700        BRU           AST61
  01FB  R   0243
                        * IF AN ADVANCE SIGNAL WITH THE ONSET RATE PASSING
                        *   PRIMARY CRITERIA FAILS HERE, IT MAY WELL BE
                        *   A CCCC (CLASS=3) TYPE SIGNAL.
  01FC      E526        LDM,2,6       U.ODR
  01FD  X   001E
  01FE      712F        SBRB,2,15     SREA6          NOT ADVANCE
  01FF  R   023D
  0200      E526        LDM,2,6       W.CNF
  0201  X   0010
  0202      E546        LDM,4,6       U.TEK
  0203  X   001D
  0204      614E        SBR,4,14
  0205      7640        TBRB,4,0      TLC6
  0206  R   0210
  0207      E940        SUI,4         3
  0208  A   0003
  0209      7640        TBRB,4,0      TMD6
  020A  R   0215
  020B      E120        SUM,2         PONHI
  020C  R   03AF
  020D      7620        TBRB,2,0      SREA6
  020E  R   023D
  020F      F70A        HOP,MAYBE
  0210      E120  TLC6  SUM,2         PONLO
  0211  R   03B1
  0212      7620        TBRB,2,0      SREA6
  0213  R   023D
  0214      F705        HOP,MAYBE
```

```
424     0215     E120  TMD6  SUM,2          PONMD
        0216  R  03B0
425     0217     7620        TBFB,2,0       SREA6
        0218  R  023D
426                         * MAYBE WE HAVE A CLASS 3 SIGNAL HERE.....
427     0219     652F  MAYBE LBP,2,14
428     021A     E626        STM,2,6        U.AST          RESET U.AST=2
        021B  X  0002
429                         * RESET |PEAK| VALUES TO |LOW PEAK| AND ESTABLISH
430                         *   A NEW PEAK CANDIDATE;
431     021C     E526        LDM,2,6        U.LFZ
        021D  R  0337
432     021E     E626        STM,2,6        U.CDT
        021F  R  0361
433     0220     E526        LDM,2,6        W.PFZ
        0221  X  000C
434     0222     E626        STM,2,6        W.LPK
        0223  X  0011
435     0224     E526        LDM,2,6        W.PAM
        0225  X  000E
436     0226     E626        STM,2,6        W.LAM
        0227  X  0027
437     0228     ED10        LDI,1          -2
        0229  A  FFFE
438     022A     E525  LPKST LDM,2,5        U.LTM
        022B  R  0345
439     022C     E625        STM,2,5        U.CTM
        022D  X  000A
440     022E     E525        LDM,2,5        W.PTM
        022F  X  000D
441     0230     E625        STM,2,5        W.LTM
        0231  X  0012
442     0232     605F        ABR,5,15
443     0233     701F        ABRB,1,15      LPKST
        0234  R  022A
444     0235     ED20        LDI,2          3
        0236  A  0003
445     0237     E626        STM,2,6        U.CLS
        0238  X  000B
446     0239     E626        STM,2,6        U.ODR
        023A  X  001F
447     023B     E700        BRU            WFA2
        023C  R  0053
448     023D     ED20  SREA6 LDI,2          6              YES...
        023E  A  0006
449     023F     E626        STM,2,6        REASN          SET REASON=6
        0240  R  03D4
450     0241     E700        BRU            FAIL
        0242  R  02EF
451     0243     E7E0  AST61 BLM,14         E:DIF          CHECK TIME SINCE ONSET
```

```
        0244  X  0009
452     0245  X  000A        DFC            U.CTM
453     0246     6600        NOP
454     0247     6600        NOP
455     0248     E1D0        SUM,13         T3
        0249  R  03AC
456     024A     76D0        TBRB,13,0      AST62          NOT LONG ENOUGH
        024B  R  029E
457                       * WE'VE SURVIVED T3 SECONDS AND THINGS LOOK PROMISING.
458     024C     E7E0      AST63 BLM,14     U:GET
        024D  X  0008
459     024E     E700        BRU            UPDIU          NO POINTS
        024F  R  0014
460     0250     6D2B        TRR,2,11                       IS...
461     0251     E126        SUM,2,6        W.PFZ           (CUR.PHASE-PEAK PHASE)
        0252  X  000C
462     0253     E126        SUM,2,6        RCMIN                > RCMIN?
        0254  R  03B8
463     0255     7620        TBRB,2,0       AST63          NO, TRY HARDER
        0256  R  024C
464                       * WE HAVE SUFFICIENT RECOVERY FOR A VALID SIGNAL.
465                       *   ALL THAT REMAINS IS TO CHECK THE RECOVERY RATE
466                       *   AGAINST THE ONSET RATE.
467     0257     ED20        LDI,2          7
        0258  A  0007
468     0259     E626        STM,2,6        U.AST          SET U.AST=7
        025A  X  0002
469     025B     ED20        LDI,2          8
        025C  A  0008
470     025D     E626        STM,2,6        U.TRL
        025E  X  002B
471     025F     6C22        ZRR,2
472     0260     E626        STM,2,6        U.TRF
        0261  X  002A
473     0262     E6B6        STM,11,6       W.RFZ          SAVE VALID RECOVERY PARAMETERS:
        0263  X  0015
474     0264     E6C5        STM,12,5       W.RTM           PHASE
        0265  X  0016
475     0266     605F        ABR,5,15
476     0267     E6D5        STM,13,5       W.RTM           TIME
        0268  X  0016
477     0269     615F        SBR,5,15
478     026A     E526        LDM,2,6        U.AMP           AMPLITUDE
        026B  X  0025
479     026C     E626        STM,2,6        W.RAM
        026D  X  0017
480     026E     E526        LDM,2,6        U.CLS
        026F  X  000B
481     0270     E920        SUI,2          3
        0271  A  0003
```

```
482     0272     7D22        TRRB,2,2      $+4
        0273  R  0276
483     0274     E700        BRU           AST64
        0275  R  029C
484     0276     E1B6        SUM,11,6      W.PFZ          R11=CUR. PEAK PHASE
        0277  X  000C
485     0278     ED20        LDI,2         W.PTM
        0279  X  000D
486     027A     6825        ADR,2,5
487     027B     E620        STM,2         $+4
        027C  R  027F
488     027D     E7E0        BLM,14        E:COT
        027E  X  001F
489     027F  A  0000        DFC           0
490     0280     E6C0        STM,12        U.DTM
        0281  X  0026
491     0282     657F        LBR,7,15
492     0283     E6D7        STM,13,7      U.DTM
        0284  X  0026
493     0285     6D76        TRR,7,6                      SAVE R6
494     0286     ED60        LDI,6         14
        0287  A  000E
495     0288     E7E0        BLM,14        E:DIF
        0289  X  0009
496     028A  X  000A        DFC           U.CTM          R13=TIME FROM PEAK
497     028B     6600        NOP
498     028C     6600        NOP
499     028D     6D67        TRR,6,7                      RESTORE R7
500     028E     EDE0        LDI,14        480            SCALE
        028F  A  01E0
501     0290     20AE        MPR,10,14
502     0291     21AD        DVR,10,13                    R10=RECOVERY RATE
503     0292     E1B6        SUM,11,6      W.CNR          IS RECRT<W.ONR?
        0293  X  0010
504     0294     76B0        TBRB,11,0     AST64
        0295  R  029C
505     0296     ED20        LDI,2         7               NO, FAILED AGAIN
        0297  A  0007
506     0298     E626        STM,2,6       REASN          SET REASON=7
        0299  R  03D4
507     029A     E700        BRU           FAIL
        029B  R  02EF
508     029C     E7F0  AST64 BLM,15        U:RP1          GENERATE MSG. ON SIGNAL
        029D  X  0006
509     029E     E7F0  AST62 BLM,15        UAST4
        029F  R  02D8
510     02A0     E700        BRU           UPDIU
        02A1  R  0014
```

```
                        ***************************************************************
                        * WHEN U.AST=7 WE HAVE A VALID SIGNAL AND ARE WAITING OUT
                        *   THE END OF THE SIGNAL.
                        * FOR ALL SIGNALS, THE CURRENT DIURNAL (U.DIU) MUST RETURN
                        *   TO WITHIN BETA OF THE ONSET DIURNAL (U.ODI).  ADVANCE
                        *   SIGNALS (U.ODR=1) MUST HAVE THE PHASE RETURN TO WITHIN
                        *   TREC OF THE ONSET PHASE.
                        * IF THE SIGNAL DOESN'T END OF IT'S OWN VOLITION WITHIN
                        *   T4 SECONDS, THE PROCESSING IS AUTOMATICALLY TERMINATED.
02A2      E526  UAST7 LDM,2,6       U.DIU          IS......
02A3  X   0004
02A4      E126        SUM,2,6       U.ODI          (U.DIU-U.ODI)
02A5  X   001B
02A6      E120        SUM,2         BETA             -BETA>0?
02A7  R   03B7
02A8      7620        TBRB,2,0      AST71          NO, GOOD END MAYBE
02A9  R   02BB
02AA      E7F0        BLM,15        SCMPD          YES , KEEP LOOKING
02AB  R   032F
02AC      E7E0  AST72 BLM,14        E:DIF          HAVE WE WAITED
02AD  X   0009
02AE  X   000A        DFC           U.CTM           LONG ENOUGH?
02AF      6600        NOP
02B0      6600        NOP
02B1      E1D0        SUM,13        T4
02B2  R   03AD
02B3      76D0        TBRB,13,0     UPDIU          NO, STILL WAITING
02B4  R   0014
02B5      8216        OBMM,1,6      U.END          FLAG TIME-OUT ENDING
02B6  X   0019
02B7      E7F0        BLM,15        U:RP2          END OF MESSAGE SIGNAL
02B8  X   0007
02B9      E700        BRU           FAIL
02BA  R   02EF
02BB      E526  AST71 LDM,2,6       U.ODR
02BC  X   001E
02BD      712F        SBRB,2,15     $+3
02BE  R   02C0
02BF      F703        HOP,AST74
02C0      712F        SBRB,2,15     AST73
02C1  R   02D1
02C2      E5A6  AST74 LDM,10,6      U.OFZ
02C3  X   001A
02C4      86F6        TBMB,15,6     U.ODR,$+5
02C5  X   001E
02C6  R   02C9
02C7      E0A6        ADM,10,6      CYCLE
02C8  R   03C6
02C9      E1A6        SUM,10,6      U.LFZ          IS....
02CA  R   0337
```

```
543     02CB      E1A0        SUM,10        TREC          (U.OFZ-CUR.PHASE)
        02CC  R   03B5
544     02CD      76A0        TBRB,10,0     AST73          -TREC<0? BRU IF YES
        02CE  R   02D1
545     02CF      E700        BRU           AST72         NO, CHECK NEXT POINT
        02D0  R   02AC
546     02D1      6C22  AST73 ZRR,2
547     02D2      E620        STM,2         U.END
        02D3  X   0019
548     02D4      E7F0        BLM,15        U:RP2         END MESSAGE GENERATOR
        02D5  X   0007
```

```
550     02D6     E700        BRU          FAIL
        02D7  R  02EF
551                     ************************************************************
552                     * UAST4 IS A SUBROUTINE TO LOOK FOR A POSSIBLE
553                     *   |VALLEY| IN A CLASS 3 WAVE.
554                     * THE MAXIMUM VALUE (LOW POINT IN THE VAVE) IS
555                     *   SAVED.  IF WE LATER DECIDE WE HAVE A CLASS 3
556                     *   SIGNAL, WE'RE SET.
557                     * CALLING SEQUENCE:
558                     *     BLM,15       UAST4
559                     *     (CHAN IN R6)
560     02D8     6D56  UAST4 TRR,5,6
561     02D9     2D51        LLS,5,1
562     02DA     E7E0  AST41 BLM,14        U:GET
        02DB  X  0008
563     02DC     FF0F        BRX,15
564     02DD     6600        NOP
565     02DE     E526        LDM,2,6       W.VPK
        02DF  X  0013
566     02E0     692B        SUR,2,11
567     02E1     7620        TBRB,2,0      $+4
        02E2  R  02E5
568     02E3     E700        BRU           UAST41
        02E4  R  02D8
569     02E5     E6B6        STM,11,6      W.VPK
        02E6  X  0013
570     02E7     E6C5        STM,12,5      W.VTM
        02E8  X  0014
571     02E9     605F        ABR,5,15
572     02EA     E6D5        STM,13,5      W.VTM
        02EB  X  0014
573     02EC     615F        SBR,5,15
574     02ED     E700        BRU           UAST41
        02EE  R  02D8
```

```
                    ************************************************************
                    * FAIL IS CALLED IF THE CURRENT SIGNAL FAILS TO MEET ALL CRITERIA.
                    *   THE REASON FOR THE FAILURE IS KEPT IN REASN.
                    * FAIL ALSO TERMINATES NORMAL PROCESSING ON A REPORTABLE SIGNAL.
02EF      6C22  FAIL  ZRR,2                          RESET:
02F0      E626        STM,2,6       U.END            U.END=0
02F1  X   0019
02F2      E626        STM,2,6       CFIRM            CFIRM=0
02F3  R   0399
02F4      E626        STM,2,6       U.CLS            U.CLS=0
02F5  X   000B
02F6      E626        STM,2,6       U.TRF            U.TRF=0
02F7  X   002A
02F8      E626        STM,2,6       SLOPE            SLOPE=0
02F9  R   038B
02FA      ED30        LDI,3         5
02FB  A   0005
02FC      E636        STM,3,6       U.TRL
02FD  X   002B
02FE      6D56        TRR,5,6
02FF      2D51        LLS,5,1
0300      E625        STM,2,5       U.OTM            BIN. ONSET TIME
0301  X   0020
0302      605F        ABR,5,15
0303      E625        STM,2,5       U.OTM
0304  X   0020
0305      602F        ABR,2,15
0306      E626        STM,2,6       U.AST            U.AST=1
0307  X   0002
0308      E520        LDM,2         U.LTF
0309  X   0022
030A      E626        STM,2,6       U.FAC            U.FAC=U.LTF
030B  X   0005
030C      760A        TBRB,0,10     WRITE
030D  R   0315
030E      E7F0  FAIL1 BLM,15        SCMPD            DUMP COMPRESSED POINTS
030F  R   032F
0310      6C22        ZRR,2
0311      E626        STM,2,6       REASN            RESET REASN FLAG
0312  R   03D4
0313      E700        BRU           UPDIU            AND GO ON.
0314  R   0014
```

```
                    ***************************************************************
                    * WRITE.. IF BIT 10 OF THE SWITCH REGISTER IS SET,
                    *   THE REASON FOR ALL SIGNAL REJECTIONS ARE DISPLAYED
                    *   ON THE ASR 35.
 0315     E526  WRITE LDM,2,6       REASN
 0316  R  03D4
 0317     7D22        TRRB,2,2      $+4            NORMAL END
 0318  R  031B
 0319     E700        BRU           FAIL1
 031A  R  030E
 031B     E820        ADI,2         #5230           |RN|
 031C  A  5230
 031D     E620        STM,2         FLMSG+7
 031E  R  03E9
 031F     0956        MBL,5,6
 0320     E850        ADI,5         #4120           |C |
 0321  A  4120
 0322     E650        STM,5         FLMSG+6
 0323  R  03E8
 0324     E7E0        BLM,14        E:FRT          GET CURRENT TIME
 0325  X  0024
 0326  R  03E2        DFC           FLMSG
 0327     6CEE        ZRR,14
 0328     E6E0        STM,14        E.IOF
 0329  X  0021
 032A     E7E0        BLM,14        E:035          SEND TO ASR 35.
 032B  X  0023
 032C  R  03E2        DFC           FLMSG
 032D     E700        BRU           FAIL1          RETURN
 032E  R  030E
```

```
                    ***********************************************************
                    * SCMPD IS A ROUTINE WHICH PASSES OVER COMPRESSED DATA
                    *   POINTS DURING THOSE PARTS OF WAVEFORM ANALYSIS THAT
                    *   DON'T USE THEM.  THE LAST ONE AND ITS TIME ARE HELD
                    *   IN U.LFZ AND U.LTM
032F      6D56      SCMPD TRR,5,6
0330      2D51            LLS,5,1                     D.P. CHANNEL POINTER
0331      E7E0            BLM,14        U:GET
0332  X   0008
0333      FF0F            BRX,15                      RETURN WHEN NONE LEFT
0334      6600            NOP
0335      E700            BRU           $-4           LOOP THRU ALL POINTS
0336  R   0331
```

```
                    ****************************************************************
                    * SINCE WE DON'T KEEP EVERY POINT, WE'LL SAVE THE LAST
                    *   VALUE AND ITS TIME HERE.
0337  A  0000  U.LFZ RES          14,0
0345  A  0000  U.LTM RES          28,0
                    ****************************************************************
                    * WHILE SEARCHING FOR THE PEAK, A LIKELY CANDIDATE MUST BE KEPT
                    *   WITH ITS TIME.  ALSO, FOR RETARD SIGNALS, THE SLOPE TO THE
                    *   POSSIBLE PEAK MUST BE RETAINED
0361  A  0000  U.CDT RES          14,0          PEAK CANDIDATE
036F  A  0000  U.CDM RES          28,0          ITS TIME
038B  A  0000  SLOPE RES          14,0          SLOPE
0399  A  0000  CFIRM RES          14,0          PEAK CONFIRMATION COUNTER
                    ****************************************************************
03A7  A  0000  TEMP  RES          2,0           WORKING STORAGE
03A9  A  0000  TEMP2 RES          1,0
                    ****************************************************************
                    * WAVEFORM TIMING PARAMETERS
                    *   T1 MAX ALLOWED TIME FROM ONSET TO PEAK
                    *   T2 MAX ALLOWED TIME TO BEGIN RECOVERY
                    *   T3 MIN ALLOWED TIME FROM ONSET TO FULL RECOVERY
                    *   T4 MAX DURATION OF SIGNAL, ONSET TO FULL RECOVERY
03AA  A  0258  T1    DFC          600           (10 MINUTES)
03AB  A  04B0  T2    DFC          1200          (20 MINUTES)
03AC  A  0258  T3    DFC          600           (10 MINUTES)
03AD  A  0E10  T4    DFC          3600          (60 MINUTES)
                    ****************************************************************
                    * WAVEFORM EVALUATION CRITERIA
                    *   POFF  PRIMARY OFFSET CRITERIA
                    *   PONHI PRIMARY ONSET RATE, HI TRACK RATES
                    *   PONMD PRIMARY ONSET RATE, MED TRACK RATES
                    *   PONLO PRIMARY ONSET RATE, LO TRACK RATES
                    *   SOFF  SECONDARY OFFSET CRITERIA
                    *   SONRT SECONDARY ONSET RATE CRITERIA, ALL TRACK RATES
                    *   LOPEK PERMISSIBLE OFFSET FOR FIRST OF MULTIPLE PEAKS
                    *             ( ADVANCE DIRECTION ONLY )
                    *   RCMIN MIN RECOVERY FROM PEAK FOR VALID RECOVERY
                    *   TREC  POINT TO WHICH PHASE MUST APPROACH ONSET TO END RECOVERY
                    *   ALPHA DIFFERENCE TWIXT U.DIU AND U.ODI TO BEGIN RECOVERY
                    *   BETA  DIFFERENCE TWIXT U.DIU AND U.ODI TO END RECOVERY
                    *   CYCLE IS THE MICROSECOND LENGTH OF ONE CYCLE (RET SIGS ONLY)
03AE  A  00A0  POFF  DFC          160           10 MICROSEC
03AF  A  0140  PONHI DFC          #140          20 MICROSEC/MIN
03B0  A  00A0  PONMD DFC          #0A0          10 MICROSEC/MIN
03B1  A  0060  PONLO DFC          #060           6 MICROSEC/MIN
03B2  A  0020  SOFF  DFC          32             2 MICROSEC
03B3  A  0030  SONRT DFC          #030           3 MICROSEC/MIN
03B4  A  0050  LOPEK DFC          80             5 MICROSEC
03B5  A  0030  TREC  DFC          48             3 MICROSEC
03B6  A  0026  ALPHA DFC          38            .3 MICROSEC/MIN
```

```
 685     03B7  A  001A  BETA  DFC          26              .2 MICROSEC/MIN
 686     03B8  A  0030  RCMIN RES          14,48
 687           R  03C6  U.CCL EQU          $
 688     03C6  A  0000  CYCLE RES          14,0
 689                    ***********************************************************************
 690                    * FAILURE MESSAGE:
 691                    * FORMAT: |123 123456  C RN|
 692                    *  WHERE:
 693                    *    C IS THE CHANNEL (A,B,C,,,,,,N)
 694                    *    R INDICATES SIGNAL REJECTION
 695                    *    N IS A CODED VALUE (1,2,.....7)
 696                    *      1 FOR EXCESSIVE TIME TO PEAK
 697                    *      2 RETARD SIGNAL FAILS OFFSET CRITERIA
 698                    *      3 ADV SIGNAL FAILS SECONDARY OFFSET CRITERIA
 699                    *      4 ADV SIGNAL FAILS SECONDARY ONSET RATE CRITERIA
 700                    *      5 EXCESSIVE TIME TO BEGIN RECOVERY
 701                    *      6 SLOPE RECOVERY TOO SOON AFTER ONSET
 702                    *      7 RECOVERY RATE GREATER THAN ONSET RATE
 703     03D4  A  0000  REASN RES          14,0
 704     03E2  A  3132  FLMSG DFC          |123 123456  C RN|,#0D0A,#0000
         03E3  A  3320
         03E4  A  3132
         03E5  A  3334
         03E6  A  3536
         03E7  A  2020
         03E8  A  4320
         03E9  A  524E
         03EA  A  0D0A
         03EB  A  0000
 705     03EC                 END

TOTAL ASSEMBLY ERRORS =   7    SIZE =  1004
 *****WARNING*** **0**  0000  GM          U$DAT
```

```
 1 0   0000     0000  GM          U$DAT
       0001  A  0000
 2                         INT          U.WRK,U.TRK,U.GAN,U.BLL,U.IHB
 3                         INT          U.CST,U.DIU,U.LTF,U.BGF,U.FAC
 4                         INT          U.CMP,U.CPC,U.CTM,U.OTM,U.DTM
 5                         INT          U.CPP,U.SLP,U.RTY,U.AST,U.CCN
 6                         INT          U.LST,U.AMP,U.OTB,U.OFZ,U.ODR
 7                         INT          U.ODI,U.OAM,U.END,U.CLS,W.PFZ
 8                         INT          W.PTM,W.PAM,W.OST,W.ONR,W.LPK
 9                         INT          W.LTM,W.VPK,W.VTM,W.RFZ,W.RTM
10                         INT          W.RAM,U.CYC,U.LSP,U.OSG,W.LAM
11                         INT          W.VAM
12                   ************************************************************
13                   ***   CAT NO.  400100-001  ***********************************
14                   ************************************************************
15                   * U$DAT IS THE COMMON DATA STORAGE AREA FOR THE
16                   *   U-DATA ANALYSIS PROGRAMS.
```

```
                    ***************************************************************
                    * U.TRK IS THE CHANNEL TRACKING RATE
                    *       (BETWEEN 0 AND 9)
                    * U.GAN IS THE CHANNEL GAIN SETTING
                    *       (BETWEEN 0 AND 24)
                    * U.BLL IS THE CHANNEL BLANKING LEVEL
                    *       (BETWEEN 0 AND 63)
0002  A  0005       U.TRK RES          14,5
0010  A  000C       U.GAN RES          14,12
001E  A  0028       U.BLL RES          14,40
```

```
                    ***************************************************************
                    * U.DIU IS THE PROGRAM'S ESTIMATE OF THE SLOPE IN
                    *   THE LONG-TERM TREND OF THE DATA.  ACTUALLY,
                    *   IT IS THE RESULT OF A DIGITAL FILTER APPLIED
                    *   TO THE LEAST SQUARES SLOPES......
                    *  WHERE:
                    *      U.FAC=U.LTF NORMALLY
                    *           =U.BGF WHILE LOOKING FOR RECOVERY
     002C  A  0000  U.DIU RES           14,0
     003A  A  0666  U.LTF DFC           #0666          =.05
     003B  A  0CCC  U.BGF DFC           #0CCC          =.10
     003C  A  0666  U.FAC RES           14,#0666
                    ***************************************************************
                    * U.LST IS A TABLE OF 10 SECOND AVERAGE POINTS
                    *   USED FOR THE LEAST SQUARES SLOPE ESTIMATES.
                    * U.LSP IS A ROW POINTER FOR U.LST
     004A  A  0000  U.LST RES           140,0
     00D6  A  0000  U.LSP DFC           0
                    ***************************************************************
                    * U.SLP IS THE LEAST SQUARES SLOPE ESTIMATE.
     00D7  A  0000  U.SLP RES           14,0
```

```
                    ***************************************************************
                    * U.WRK IS THE WORK AREA FOR THE VARIOUS U ANALYSIS
                    *   PROGRAMS.  AFTER 10 SECONDS OF DATA IS COLLECTED
                    *   IN E.UBF BY E$SEC (E$CLK) AND E$UIN, THAT BUFFER
                    *   IS FLUSHED INTO ROWS 2-11 OF U.WRK AND THE
                    *   ANALYSIS PROGRAMS ARE SCHEDULED.  ROW 1 OF U.WRK
                    *   HOLDS THE LAST SECOND'S DATA FROM THE PREVIOUS
                    *   10 SECOND BLOCK.
                    * FORMAT:  (A:AMP;A:PHASE;B:BLANK RATE)
                    *CHAN    A       B       C    ......   N   (TIME)
                    *T T-1 A P B  A P B  A P B ...... A P B  X Y
                    *I TO  A P B  A P B  A P B ...... A P B  X Y
                    *M T1  A P B  A P B  A P B ...... A P B  X Y
                    *E T2  .....
                    *.       .....
                    *.         .....
                    *  T9  A P B  A P B  A P B ...... A P B  X Y
                    * U.CTM IS A POINTER TO THE [CURRENT TIME]
     00E5  A  0000  U.WRK RES            484,0
           R  02C7  U.CTM EQU            $-2
                    ***************************************************************
                    * U.CMP IS THE COMPRESSED DATA BUFFER...
                    *   EACH CHANNEL GETS 10 ENTRIES OF 3 WORDS
                    *       (ONE OF PHASE, TWO OF TIME)
                    * U.CPP ID A POINTER TO THE START OF EACH
                    *   CHANNEL'S AREA.
                    * U.CPC IS THE COMPRESSED DATA COUNTER, TELLING THE
                    *   NUMBER OF COMPRESSED POINTS FOUND FOR EACH CHAN
                    *   DURING THE CURRENT PERIOD.
     02C9  A  0000  U.CMP RES            420,0
     046D  R  02C9  U.CPP DFC            U.CMP          CHAN 0
     046E  R  02E7        DFC            U.CMP+30       CHAN 1
     046F  R  0305        DFC            U.CMP+60       CHAN 2
     0470  R  0323        DFC            U.CMP+90       CHAN 3
     0471  R  0341        DFC            U.CMP+120      CHAN 4
     0472  R  035F        DFC            U.CMP+150      CHAN 5
     0473  R  037D        DFC            U.CMP+180      CHAN 6
     0474  R  039B        DFC            U.CMP+210      CHAN 7
     0475  R  03B9        DFC            U.CMP+240      CHAN 8
     0476  R  03D7        DFC            U.CMP+270      CHAN 9
     0477  R  03F5        DFC            U.CMP+300      CHAN 10
     0478  R  0413        DFC            U.CMP+330      CHAN 11
     0479  R  0431        DFC            U.CMP+360      CHAN 12
     047A  R  044F        DFC            U.CMP+390      CHAN 13
     047B  A  0000  U.CPC RES            14,0
                    ***************************************************************
                    * U.CYC IS SET TO EITHER 150 OR -50 MICROSECONDS
                    *   TO SHOW THE DIRECTION OF A 50 MICROSECOND
                    *   CYCLE SHIFT SENT BY THE E$UIN DURING THE PREVIOUS
                    *   TEN SECOND DATA BLOCK.  BIT 0 OF THE PHASE INPUT
```

```
                    *   ON THE APPROPRIATE CHANNEL IS SET FOR THE LAST
                    *   VALUE RECEIVED BEFORE THE SHIFT WAS SENT.
                    * U.CCN IS THE ACCUMULATION OF CYCLE SHIFTS (U.CYC)
                    *   ON EACH CHANNEL.  THIS VALUE IS ADDED TO THE PHASE
                    *   TO GIVE A TRUE REPRESENTATION OF THE PHASE.
     0489  A  0000  U.CYC RES          14,0
     0497  A  0000  U.CCN RES          14,0
```

```
                    ***************************************************************
                    * U.IHB; IF AN INE OR MAINTENANCE CONDITION EXISTS,
                    *   U.IHB IS SET TO INHIBIT PROCESSING ON THAT CHAN.
                    *   BIT 0=0 PERMITS NORMAL PROCESSING
                    *         =1 INHIBITS PROCESSING ON THE CHANNEL
04A5  A  0000       U.IHB RES           14,0
                    ***************************************************************
                    * U.RTY IS THE CHANNEL RECOVERY TALLY.....
                    *   WHENEVER U$RTA SENSES BAD DATA ON A CHANNEL,
                    *   THAT CHAN'S RECOVERY TALLY IS SET TO -18.
                    *   WHEN THE DATA IS AGAIN CONSIDERED |GOOD|, THE
                    *   TALLY GETS INCREMENTED ONCE EACH TEN SECONDS.
                    *   IF U.RTY REACHES ZERO, THE CHANNEL IS PUT UP.
04B3  A  FFEE       U.RTY RES           14,-18
                    ***************************************************************
                    * U.CST IS THE CHANNEL'S PROCESSING STATUS:
                    *    =1 FOR UP
                    *    =2 FOR COASTING, NO REPORT
                    *    =3 FOR COASTING, REPORTED (LOGGED ON TTY)
                    *    =4 FOR DOWN
04C1  A  0004       U.CST RES           14,4
                    ***************************************************************
                    * U.AST IS THE CHANNEL'S ALARM STATUS:
                    *    =1 WHEN LOOKING FOR ONSET
                    *    =2 WHEN LOOKING FOR PEAK, ADV SIGNAL
                    *    =3 WHEN LOOKING FOR PEAK, RET SIGNAL
                    *    =4 WHEN LOOKING FOR BACKSWING PEAK, MULTIPLE PEAK SIGNAL
                    *    =5 WHEN LOOKING FOR RECOVERY TO BEGIN
                    *    =6 WHEN LOOKING FOR VALID RECOVERY
                    *    =7 WHEN LOOKING FOR THE SIGNAL'S END.
04CF  A  0000       U.AST RES           14,0
                    ***************************************************************
                    * U.CLS IS THE WAVEFORM CLASS:
                    *    =1 FOR MEETING PRIMARY CRITERIA
                    *    =2 FOR MEETING SECONDARY CRITERIA
                    *    =3 FOR MULTIPLE PEAK SIGNAL
04DD  A  0000       U.CLS RES           14,0
                    ***************************************************************
                    * U.END INDICATES THE TYPE OF SIGNAL ENDING:
                    *    BIT 0=0 FOR NORMAL END TO WAVEFORM
                    *         =1 FOR END DUE TO CHAN GOING DOWN
                    *    BIT 1=0 NORMAL
                    *         =1 TIME LIMITED TERMINATION
                    *    BIT 2=0 NORMAL
                    *         =1 NEW ONSET TERMINATES SIGNAL
04EB  A  0000       U.END RES           14,0
```

```
                    ***********************************************************************
                    * U.OTM IS THE ONSET TIME IN SECONDS (BINARY).
                    *   SUBROUTINE E$DIF CHECKS THE TIME DIFFERENCE
                    *   BETWEEN A FIXED VALUE AND THE CHANNEL'S ONSET
                    *   TIME (U.OTM).
                    * U.DTM IS USED BY E$DIF WHEN A COMPARISON IS DESIRED
                    *   TO SOME TIME OTHER THAN AN ONSET TIME.
                    * U.OTB IS THE ONSET TIME IN BCD
                    * U.OAM IS THE ONSET AMPLITUDE
                    * U.OFZ IS THE ONSET PHASE
                    * U.ODI IS THE ONSET DIURNAL
                    * U.ODR IS THE DIRECTION OF ONSET
                    *    =1 FOR ADVANCE
                    *    =2 FOR RETARD
                    * U.OSG IS THE STD. DEVIATION AT ONSET
     04F9  A  0000  U.OTM RES          28,0
     0515  A  0000  U.DTM RES          2,0
     0517  A  0000  U.OTB RES          28,0
     0533  A  0000  U.OAM RES          14,0
     0541  A  0000  U.OFZ RES          14,0
     054F  A  0000  U.ODR RES          14,0
     055D  A  0000  U.ODI RES          14,0
     056B  A  0000  U.OSG RES          14,0
```

```
                    ***************************************************************
                    * W.PFZ IS THE PEAK PHASE
                    * W.PTM IS THE PEAK AMPLITUDE
                    * W.OST IS THE PHASE OFFSET TO PEAK
                    * W.ONR IS THE RATE OF ONSET TO PEAK
                    * W.LPK IS THE PHASE FOR A CLASS 3 LOW PEAK
                    * W.LTM IS THE TIME (BCD) OF THE W.LPK
                    * W.LAM IS THE AMP AT W.LTM
                    * W.VPK IS THE CLASS 3 VALLEY PEAK PHASE
                    * W.VTM IS THE TIME (BCD) OF THE W.VPK
                    * W.VAM IS THE AMP AT W.VTM
     0579  A  0000  W.PFZ RES          14,0
     0587  A  0000  W.PTM RES          28,0
     05A3  A  0000  W.PAM RES          14,0
     05B1  A  0000  W.OST RES          14,0
     05BF  A  0000  W.ONR RES          14,0
     05CD  A  0000  W.LPK RES          14,0
     05DB  A  0000  W.LTM RES          28,0
     05F7  A  0000  W.LAM RES          14,0
     0605  A  0000  W.VPK RES          14,0
     0613  A  0000  W.VTM RES          28,0
     062F  A  0000  W.VAM RES          14,0
```

```
                    ****************************************************************
                    * W.RFZ IS THE PHASE AT VALID RECOVERY
                    * W.RTM IS THE BCD TIME OF VALID RECOVERY
                    * W.RAM IS THE AMPLITUDE AT VALID RECOVERY
     063D  A  0000  W.RFZ RES          14,0
     064B  A  0000  W.RTM RES          28,0
     0667  A  0000  W.RAM RES          14,0
```

```
 211                    ***********************************************************************
 212                    *U.AMP IS THE CURRENT AMPLITUDE ESTIMATE.
 213                    *  ACTUALLY, IT'S THE LAST AMPLITUDE VALUE OF
 214                    *  THE 10 SECOND PERIOD JUST ENDED.
 215     0675  A  0000  U.AMP RES          14,0
 216     0683                 END
```

TOTAL ASSEMBLY ERRORS = 1 SIZE = 1667

```
 1                    PGM          U$REP
 2                     INT          U:RP1,U:RP2,U:RP3,U.UDR
 3                     EXT          E:FRT,E:BAD,E.BDF,U.FRQ,U.TRK
 4                     EXT          U.GAN,U.BLL,M.STA,U.CLS,U.ODR
 5                     EXT          U.OSG,E:FMF,E:FAM,E:FCT,E.TM1
 6                     EXT          E.TM2,E.28F,E:028,U.AMP,U.OTB
 7                     EXT          U.OFZ,U.OAM,U.ODI,W.PFZ,W.PAM
 8                     EXT          W.RTM,W.RFZ,W.RAM,U.DIU,W.LTM
 9                     EXT          W.LPK,W.LAM,W.VTM,W.VPK,W.VAM
10                     EXT          W.OST,W.ONR,U.LFZ,U.LTM,U.END
11                     EXT          W.PTM,W.BDC,E:COT,U.DTM,U.OTM
12                     EXT          E:SKD,E:BDC,U.CTM,E:DIF,E.BSG
13                     EXT          U.CCL
14                *    CAT NO.  400100-008
15                * U$REP IS THE REPORTABLE SIGNAL MESSAGE GENERATOR.
16                *   THE GENERATOR CONSISTS OF THREE SECTIONS:
17                *  U:RP1 PRODUCES A MESSAGE FOR THE OPERATOR LISTING
18                *   ALL AVAILABLE INFORMATION ABOUT THE SIGNAL. THIS
19                *   ROUTINE IS CALLED AT HALF (OR VALID) RECOVERY.
20                *  U:RP2 PRODUCES A MESSAGE FOR THE OPERATOR LISTING
21                *   THE DATA ON THE SIGNAL SINCE HALF RECOVERY.  THIS
22                *   ROUTINE SETS UP THE CALL TO U:RP3.
23                *  U:RP3 PRODUCES THE UDR FOR HQ.
```

```
                        ********************************************************
                        * U:RP1  CALLED BY U:WFA WHEN A SIGNAL HAS PASSED
                        *   ALL REPORT CRITERIA AND HAS A HALF (VALID) RECOVERY.
                        * CALLING SEQUENCE:
                        *     BLM,15        U:RP1
                        * USING:-----
                        *   ONSET----
                        *    TIME FROM U.OTB
                        *    PHASE FROM U.OFZ
                        *    AMP FROM U.OAM
                        *    DIURNAL FROM U.ODI
                        *   PEAK----
                        *    TIME FROM W.PTM
                        *    PHASE FROM W.PFZ
                        *    AMP FROM W.PAM
                        *   HALF RECOVERY----
                        *    TIME FROM W.RTM
                        *    PHASE FROM W.RFZ
                        *    AMP FROM W.RAM
                        *    DIURNAL FROM U.DIU
                        *  AND IF THE SIGNAL IS A CLASS 3:
                        *   1ST PEAK----
                        *    TIME FROM W.LTM
                        *    PHASE FROM W.LPK
                        *    AMP FROM W.LAM
                        *   2ND PEAK----
                        *    TIME FROM W.VTM
                        *    PHASE  FROM W.VPK
                        *    AMP FROM W.VAM
0000      A510          U:RP1 SFM,1         RPSV1          SAVE REGISTERS
0001  R   0635
0002      A5A0            SFM,10        RPSV2
0003  R   063C
                        * ASSIGN NEXT UDR NUMVER TO THIS SIGNAL
                        *   AND UPDATE COUNT.
0004      E510            LDM,1         U.UDR
0005  R   061F
0006      E616            STM,1,6       UDRNO
0007  R   0611
0008      80F0            ABMM,15       U.UDR
0009  R   061F
000A      E516            LDM,1,6       U.ODR
000B  X   000A
000C      E616            STM,1,6       ZODR
000D  R   077F
000E      E516            LDM,1,6       U.CLS
000F  X   0009
0010      E616            STM,1,6       ZCLS
0011  R   06C9
0012      6D56            TRR,5,6
```

```
 66     0013      2D51        LLS,5,1
 67     0014      E515        LDM,1,5       U.OTM
        0015  X   002D
 68     0016      E615        STM,1,5       ZOTM
        0017  R   072B
 69     0018      605F        ABR,5,15
 70     0019      E515        LDM,1,5       U.OTM
        001A  X   002D
 71     001B      E615        STM,1,5       ZOTM
        001C  R   072B
 72                          * DO 5 LINE HEADER.....
 73     001D      E7F0        BLM,15        HEADR
        001E  R   0332
 74                          * DO LONG ONSET LINE
 75     001F      6C11        ZRR,1
 76     0020      E610        STM,1         LINEN
        0021  R   0620
 77     0022      E516        LDM,1,6       U.OFZ
        0023  X   0015
 78     0024      E610        STM,1         TPHAS
        0025  R   0632
 79     0026      E616        STM,1,6       ZOFZ
        0027  R   0819
 80     0028      E516        LDM,1,6       U.OAM
        0029  X   0016
 81     002A      E616        STM,1,6       ZOAM
        002B  R   0763
 82     002C      E610        STM,1         TAMP
        002D  R   0633
 83     002E      E516        LDM,1,6       U.ODI
        002F  X   0017
 84     0030      E610        STM,1         TDIUR
        0031  R   0634
 85     0032      6D56        TRR,5,6
 86     0033      2D51        LLS,5,1
 87     0034      E515        LDM,1,5       U.OTB
        0035  X   0014
 88     0036      E615        STM,1,5       ZOTB
        0037  R   0747
 89     0038      E610        STM,1         E.TM1
        0039  X   000F
 90     003A      605F        ABR,5,15
 91     003B      E515        LDM,1,5       U.OTB
        003C  X   0014
 92     003D      E615        STM,1,5       ZOTB
        003E  R   0747
 93     003F      E610        STM,1         E.TM2
        0040  X   0010
 94     0041      E7F0        BLM,15        LONGL
        0042  R   03FC
```

```
                        *  IF CLASS NOT 3, GO TO PEAK OUTPUT
                        *   ELSE, DO SHORT 1ST PEAK
     0043     E516          LDM,1,6       U.CLS
     0044  X  0009
     0045     E616          STM,1,6       ZCLS
     0046  R  06C9
     0047     E910          SUI,1         #3
     0048  A  0003
     0049     7D11          TRRB,1,1      PKOUT
     004A  R  007B
     004B     651F          LBR,1,15
     004C     E610          STM,1         LINEN
     004D  R  0620
     004E     E516          LDM,1,6       W.LPK
     004F  X  001F
     0050     E610          STM,1         TPHAS
     0051  R  0632
     0052     E516          LDM,1,6       W.LAM
     0053  X  0020
     0054     E610          STM,1         TAMP
     0055  R  0633
     0056     6D56          TRR,5,6
     0057     2D51          LLS,5,1
     0058     E515          LDM,1,5       W.LTM
     0059  X  001E
     005A     E610          STM,1         E.TM1
     005B  X  000F
     005C     605F          ABR,5,15
     005D     E515          LDM,1,5       W.LTM
     005E  X  001E
     005F     E610          STM,1         E.TM2
     0060  X  0010
     0061     E7F0          BLM,15        SHRTL
     0062  R  042E
                        * AND DO SHORT 2ND PEAK LINE
     0063     651E          LBR,1,14
     0064     E610          STM,1         LINEN
     0065  R  0620
     0066     E516          LDM,1,6       W.VPK
     0067  X  0022
     0068     E610          STM,1         TPHAS
     0069  R  0632
     006A     E516          LDM,1,6       W.VAM
     006B  X  0023
     006C     E610          STM,1         TAMP
     006D  R  0633
     006E     6D56          TRR,5,6
     006F     2D51          LLS,5,1
     0070     E515          LDM,1,5       W.VTM
     0071  X  0021
```

```
125     0072      E610        STM,1        E.TM1
        0073  X   000F
126     0074      605F        ABR,5,15
127     0075      E515        LDM,1,5      W.VTM
        0076  X   0021
128     0077      E610        STM,1        E.TM2
        0078  X   0010
129     0079      E7F0        BLM,15       SHRTL
        007A  R   042E
130                         * DO SHORT PEAK LINE
131     007B      ED10      PKOUT LDI,1      3
        007C  A   0003
132     007D      E610        STM,1        LINEN
        007E  R   0620
133     007F      E516        LDM,1,6      W.PFZ
        0080  X   0018
134     0081      E610        STM,1        TPHAS
        0082  R   0632
135     0083      E516        LDM,1,6      W.PAM
        0084  X   0019
136     0085      E616        STM,1,6      ZPAM
        0086  R   07B7
137     0087      E610        STM,1        TAMP
        0088  R   0633
138     0089      6D56        TRR,5,6
139     008A      2D51        LLS,5,1
140     008B      E515        LDM,1,5      W.PTM
        008C  X   0029
141     008D      E615        STM,1,5      ZPTM
        008E  R   079B
142     008F      E610        STM,1        E.TM1
        0090  X   000F
143     0091      605F        ABR,5,15
144     0092      E515        LDM,1,5      W.PTM
        0093  X   0029
145     0094      E615        STM,1,5      ZPTM
        0095  R   079B
146     0096      E610        STM,1        E.TM2
        0097  X   0010
147     0098      E7F0        BLM,15       SHRTL
        0099  R   042E
148                         * DO LONG HALF RECOVERY LINE
149     009A      651D        LBR,1,13
150     009B      E610        STM,1        LINEN
        009C  R   0620
151     009D      E516        LDM,1,6      W.RFZ
        009E  X   001B
152     009F      E616        STM,1,6      ZRFZ
        00A0  R   07EF
153     00A1      E610        STM,1        TPHAS
```

```
        00A2  R  0632
154     00A3     E516        LDM,1,6       W.RAM
        00A4  X  001C
155     00A5     E616        STM,1,6       ZRAM
        00A6  R  07E1
156     00A7     E610        STM,1         TAMP
        00A8  R  0633
157     00A9     E516        LDM,1,6       U.DIU
        00AA  X  001D
158     00AB     E610        STM,1         TDIUR
        00AC  R  0634
159     00AD     6D56        TRR,5,6
160     00AE     2D51        LLS,5,1
161     00AF     E515        LDM,1,5       W.RTM
        00B0  X  001A
162     00B1     E615        STM,1,5       ZRTM
        00B2  R  07C5
163     00B3     E610        STM,1         E.TM1
        00B4  X  000F
164     00B5     605F        ABR,5,15
165     00B6     E515        LDM,1,5       W.RTM
        00B7  X  001A
166     00B8     E615        STM,1,5       ZRTM
        00B9  R  07C5
167     00BA     E610        STM,1         E.TM2
        00BB  X  0010
168     00BC     E7F0        BLM,15        LONGL
        00BD  R  03FC
169                       * SET UP OFFSET AND ONSET RATE
170     00BE     E5C6        LDM,12,6      W.OST
        00BF  X  0024
171     00C0     E6C6        STM,12,6      ZOST
        00C1  R  0771
172     00C2     E7F0        BLM,15        E:FMF
        00C3  X  000C
173     00C4  R  062D        DFC           TEMP
174     00C5     ED10        LDI,1         -4
        00C6  A  FFFC
175     00C7     E521        LDM,2,1       TEMP+5
        00C8  R  0632
176     00C9     E621        STM,2,1       M03S1+4
        00CA  R  052F
177     00CB     701F        ABRB,1,15     $-4
        00CC  R  00C7
178     00CD     E536        LDM,3,6       W.ONR
        00CE  X  0025
179     00CF     E636        STM,3,6       ZONR
        00D0  R  078D
180     00D1     ED10        LDI,1         #A
        00D2  A  000A
```

```
181   00D3     2021      MPR,2,1
182   00D4     2A23      RAD,2,3
183   00D5     603F      ABR,3,15
184   00D6     2B31      RAS,3,1
185   00D7     6DC3      TRR,12,3
186   00D8     E7E0      BLM,14        E:BAD
      00D9  X  0002
187   00DA     ED10      LDI,1         E.BDF
      00DB  X  0003
188   00DC     FD21      LDX,2,1
189   00DD     E820      ADI,2         #2E00
      00DE  A  2E00
190   00DF     E620      STM,2         M03S2+2
      00E0  R  0538
191   00E1     601E      ABR,1,14
192   00E2     FD21      LDX,2,1
193   00E3     0922      MBL,2,2
194   00E4     611F      SBR,1,15
195   00E5     F821      ADX,2,1
196   00E6     E620      STM,2         M03S2+1
      00E7  R  0537
197   00E8     601E      ABR,1,14
198   00E9     FD21      LDX,2,1
199   00EA     E820      ADI,2         #2000
      00EB  A  2000
200   00EC     E620      STM,2         M03S2
      00ED  R  0536
201   00EE     6C22      ZRR,2
202   00EF     E620      STM,2         E.28F
      00F0  X  0011
203   00F1     E7E0      BLM,14        E:028
      00F2  X  0012
204   00F3  R  0526      DFC           MSG03
205                     * RESTORE REGISTERS AND RETURN
206   00F4     A410      LFM,1         RPSV1
      00F5  R  0635
207   00F6     A4A0      LFM,10        RPSV2
      00F7  R  063C
208   00F8     FF0F      BRX,15
209                     ************************************************************
```

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                        ************************************************************
                        * U:RP2 IS CALLED WHEN THE SIGNAL ON THE CHANNEL IN
                        *   R6 IS TERMINATED,  THIS ROUTINE PRINTS PERTINENT
                        *   INFORMATION ABOUT THE FINAL PART OF THE SIGNAL,
                        *   SAVES INFORMATICN FOR THE UDR, AND SETS UP THE
                        *   CALL TO U:RP3 TC PREPARE THE UDR.
00F9        A510        U:RP2 SFM,1         RPSV1
00FA   R    0635
00FB        A5A0              SFM,10        RPSV2
00FC   R    063C
                        * SET UP 5 LINE HEADER
00FD        E7F0              BLM,15        HEADR
00FE   R    0332
                        * SET UP LONG FULL RECOVERY LINE
00FF        ED10              LDI,1         5
0100   A    0005
0101        E610              STM,1         LINEN
0102   R    0620
0103        E516              LDM,1,6       U.LFZ
0104   X    0026
0105        E616              STM,1,6       ZFFZ
0106   R    0835
0107        E610              STM,1         TPHAS
0108   R    0632
0109        E516              LDM,1,6       U.AMP
010A   X    0013
010B        E616              STM,1,6       ZFAM
010C   R    0827
010D        E610              STM,1         TAMP
010E   R    0633
010F        E516              LDM,1,6       U.DIU
0110   X    001D
0111        E610              STM,1         TDIUR
0112   R    0634
0113        6D56              TRR,5,6
0114        2D51              LLS,5,1
0115        E515              LDM,1,5       U.LTM
0116   X    0027
0117        E615              STM,1,5       ZFTM
0118   R    0843
0119        E610              STM,1         E.TM1
011A   X    000F
011B        605F              ABR,5,15
011C        E515              LDM,1,5       U.LTM
011D   X    0027
011E        E615              STM,1,5       ZFTM
011F   R    0843
0120        E610              STM,1         E.TM2
0121   X    0010
0122        E7F0              BLM,15        LONGL
```

```
        0123  R  03FC
242                     * DETERMINE HOW SIGNAL ENDED AND LOG
243     0124     8606         TBMB,0,6      U.END,SGLST
        0125  X  0028
        0126  R  0130
244     0127     8616         TBMB,1,6      U.END,TMLAP
        0128  X  0028
        0129  R  0133
245     012A     8626         TBMB,2,6      U.END,NUONS
        012B  X  0028
        012C  R  0136
246     012D     ED10         LDI,1         END1
        012E  R  0642
247     012F     F709         HOP,STRND
248     0130     ED10   SGLST LDI,1         END3
        0131  R  064E
249     0132     F706         HOP,STRND
250     0133     ED10   TMLAP LDI,1         END2
        0134  R  0648
251     0135     F703         HOP,STRND
252     0136     ED10   NUONS LDI,1         END4
        0137  R  0654
253     0138     ED20   STRND LDI,2         -6
        0139  A  FFFA
254     013A     FD31         LDX,3,1
255     013B     E632         STM,3,2       M04S1+6
        013C  R  054A
256     013D     601F         ABR,1,15
257     013E     702F         ABRB,2,15     STRND+2
        013F  R  013A
258                     * OUTPUT LAST LINE SETTING FLAG TO HAVE U:RP3
259                     *   SCHEDULED WHEN ASR 28 BECOMES AVAILABLE.
260     0140     6520         LBR,2,0
261     0141     E620         STM,2         E.28F
        0142  X  0011
262     0143     E7E0         BLM,14        E:028
        0144  X  0012
263     0145  R  053A         DFC           MSG04
264                     * SAVE ALL DATA NEEDED FOR U:RP3...
265     0146     E516         LDM,1,6       U.END
        0147  X  0028
266     0148     E616         STM,1,6       ZEND
        0149  R  086D
267     014A     8206         OBMM,0,6      INPRG          FLAG REPORTABLE ON THIS CHAN
        014B  R  085F
268                     * NOW GET THE HELL OUT OF THIS PROGRAM
269     014C     A410         LFM,1         RPSV1
        014D  R  0635
270     014E     A4A0         LFM,10        RPSV2
        014F  R  063C
```

```
271     0150     FF0F        BRX,15
272                 ************************************************************
```

```
                        ****************************************************************
                        * U:RP3 SETS UP ONE RSD MESSAGE AND RESCHEDULES ITSELF
     0151      6C66    U:RP3 ZRR,6                          INIT CHAN
     0152      8606          TBMB,0,6      INPRG,RP301
     0153  R   085F
     0154  R   0162
     0155      606F          ABR,6,15
     0156      ED50          LDI,5         14
     0157  A   000E
     0158      7956          SURB,5,6      U:RP3+1
     0159  R   0152
                        * NO MORE TO OUTPUT
     015A      6C66          ZRR,6
     015B      E660          STM,6         E.28F
     015C  X   0011
     015D      E7E0          BLM,14        E:028
     015E  X   0012
     015F  R   0569          DFC           LEADR+25
     0160      E700          BRU           E:SKD
     0161  X   002E
                        * FIRST LINE OUTPUT: LEADER/RSD ONE ONE ONE/LEADER
     0162      6510    RP301 LBR,1,0
     0163      E610          STM,1         E.28F
     0164  X   0011
     0165      E7E0          BLM,14        E:028
     0166  X   0012
     0167  R   0550          DFC           LEADR
     0168      8106          ZBMM,0,6      INPRG
     0169  R   085F
     016A      E5C6          LDM,12,6      UDRNO
     016B  R   0611
     016C      E7E0          BLM,14        E:BDC
     016D  X   002F
     016E      ED70          LDI,7         3
     016F  A   0003
     0170      EDA0          LDI,10        MOSS1
     0171  R   056F
     0172      6CBB          ZRR,11
     0173      E7E0          BLM,14        CUTNO
     0174  R   0490
     0175      6C55          ZRR,5
     0176      AF5A          SBX,5,10
     0177      60BF          ABR,11,15
     0178      AF5A          SBX,5,10
     0179      6550          LBR,5,0
     017A      E650          STM,5         E.28F
     017B  X   0011
     017C      E7E0          BLM,14        E:028
     017D  X   0012
     017E  R   056B          DFC           MSGO5
```

```
                        * LINE 2: CLASS, TYPE, FRQ CALL LTRS, PATH, DOY
017F      ED50          LDI,5        #41
0180  A   0041
0181      E546          LDM,4,6      ZCLS
0182  R   06C9
0183      714E          SBRB,4,14    $+3
0184  R   0186
0185      605F          ABR,5,15
0186      EDA0          LDI,10       M06S1
0187  R   0583
0188      6CBB          ZRR,11
0189      AF5A          SBX,5,10
018A      60BF          ABR,11,15
018B      ED50          LDI,5        #2C
018C  A   002C
018D      AF5A          SBX,5,10
018E      60BF          ABR,11,15
                        * STORE TYPE:
018F      E546          LDM,4,6      ZTYPE
0190  R   06D7
0191      6C55          ZRR,5
0192      ED30          LDI,3        -6
0193  A   FFFA
0194      E7F0          BLM,15       STRCH        TYPE
0195  R   0462
0196      ED50          LDI,5        #2C
0197  A   002C
0198      AF5A          SBX,5,10                  ,
0199      60BF          ABR,11,15
                        * DO FREQUENCY AND CALL LETTERS
019A      6D16          TRR,1,6
019B      2D11          LLS,1,1
019C      6D41          TRR,4,1
019D      E840          ADI,4        ZFRQ
019E  R   06E5
019F      6C55          ZRR,5
01A0      ED30          LDI,3        -4
01A1  A   FFFC
01A2      E7F0          BLM,15       STRCH        FREQ
01A3  R   0462
                        * DO CALL LETTERS
01A4      6D41          TRR,4,1
01A5      E840          ADI,4        CALLT
01A6  R   0701
01A7      E7F0          BLM,15       STRCH        CALL LETTERS
01A8  R   0462
01A9      ED50          LDI,5        #2C
01AA  A   002C
01AB      AF5A          SBX,5,10
01AC      60BF          ABR,11,15                 ,
```

```
                        * INDICATE FRCNT OR BACK PATH
 01AD      ED50              LDI,5          11
 01AE  A   000B
 01AF      86A6              TBMB,10,6      ZSTA,$+4
 01B0  R   071D
 01B1  R   01B3
 01B2      615F              SBR,5,15
 01B3      E7F0              BLM,15         ABCNO          FRONT/BACK
 01B4  R   0451
 01B5      ED50              LDI,5          #2C
 01B6  A   002C
 01B7      AF5A              SBX,5,10
 01B8      60BF              ABR,11,15                     ,
                        * DO DAY OF YEAR
 01B9      6C22              ZRR,2
 01BA      E530              LDM,3          U.CTM
 01BB  X   0030
 01BC      2C22              LLD,2,2
 01BD      6D52              TRR,5,2
 01BE      E7F0              BLM,15         ABCNO          1ST DIGIT
 01BF  R   0451
 01C0      6C22              ZRR,2
 01C1      2C24              LLD,2,4
 01C2      6D52              TRR,5,2
 01C3      E7F0              BLM,15         ABCNO          2ND DIGIT
 01C4  R   0451
 01C5      6C22              ZRR,2
 01C6      2C24              LLD,2,4
 01C7      6D52              TRR,5,2
 01C8      E7F0              BLM,15         ABCNO          3RD DIGIT
 01C9  R   0451
                        * END LINE AND OUTPUT
 01CA      E7F0              BLM,15         TERLN
 01CB  R   049A
                        * SET UP PARAGRAPH A.
 01CC      ED50              LDI,5          |  |
 01CD  A   2020
 01CE      E650              STM,5          M06S1
 01CF  R   0583
 01D0      ED50              LDI,5          |A.|
 01D1  A   412E
 01D2      E650              STM,5          M06S1+1
 01D3  R   0584
 01D4      EDA0              LDI,10         M06S1+2        SET UP FOR OUTPUT
 01D5  R   0585
 01D6      6CBB              ZRR,11
 01D7      6D76              TRR,7,6
 01D8      2D71              LLS,7,1
 01D9      E537              LDM,3,7        ZOTB
 01DA  R   0747
```

```
                        * DO SIX DIGIT ONSET TIME
01DB      6C22          ZRR,2
01DC      2D3A          LLS,3,10
01DD      2C22          LLD,2,2
01DE      6D52          TRR,5,2
01DF      E7F0          BLM,15        ABCNO          1ST DIGIT (HRS X 10)
01E0  R   0451
01E1      6C22          ZRR,2
01E2      2C24          LLD,2,4
01E3      6D52          TRR,5,2
01E4      E7F0          BLM,15        ABCNO          2ND DIGIT (HR X 1)
01E5  R   0451
01E6      607F          ABR,7,15
01E7      E537          LDM,3,7       U.OTB
01E8  X   0014
01E9      6C22          ZRR,2
01EA      2C25          LLD,2,5
01EB      6D52          TRR,5,2
01EC      E7F0          BLM,15        ABCNO          3RD DIGIT (MIN X 10)
01ED  R   0451
01EE      6C22          ZRR,2
01EF      2C24          LLD,2,4
01F0      6D52          TRR,5,2
01F1      E7F0          BLM,15        ABCNO          4TH DIGIT (MIN X 1)
01F2  R   0451
01F3      6C22          ZRR,2
01F4      2C23          LLD,2,3
01F5      6D52          TRR,5,2
01F6      E7F0          BLM,15        ABCNO          5TH DIGIT (SEC X 10)
01F7  R   0451
01F8      6C22          ZRR,2
01F9      2C24          LLD,2,4
01FA      6D52          TRR,5,2
01FB      E7F0          BLM,15        ABCNO          6TH DIGIT (SEC X 1)
01FC  R   0451
01FD      ED50          LDI,5         #2C
01FE  A   002C
01FF      AF5A          SBX,5,10                     ,
0200      60BF          ABR,11,15
0201      E5C6          LDM,12,6      ZOST           OFFSET
0202  R   0771
0203      60CC          ABR,12,12                    ROUND OFF
0204      29C4          RLS,12,4
0205      E7E0          BLM,14        E:BDC
0206  X   002F
0207      ED70          LDI,7         3
0208  A   0003
0209      E7E0          BLM,14        OUTNO          3 DIGIT OFFSET
020A  R   0490
020B      ED50          LDI,5         #2C
```

```
        020C  A  002C
414     020D     AF5A        SBX,5,10                          ,
415     020E     60BF        ABR,11,15
416     020F     E546        LDM,4,6        ZODR
        0210  R  077F
417     0211     ED50        LDI,5          19
        0212  A  0013
418     0213     714E        SBRB,4,14      $+3
        0214  R  0216
419     0215     F702        HOP,$+2
420     0216     615F        SBR,5,15
421     0217     E7F0        BLM,15         ABCNO          DIRECTION
        0218  R  0451
422     0219     E7E0        BLM,14         NXTLN
        021A  R  04A5
423     021B     E5C6        LDM,12,6       ZONR
        021C  R  078D
424     021D     60CC        ABR,12,12                     ROUND OFF
425     021E     29C4        RLS,12,4
426     021F     E7E0        BLM,14         E:BDC
        0220  X  002E
427     0221     ED70        LDI,7          3
        0222  A  0003
428     0223     E7E0        BLM,14         OUTNO          THREE DIGIT ONSET RATE
        0224  R  0490
429     0225     ED50        LDI,5          #2C
        0226  A  002C
430     0227     AF5A        SBX,5,10
431     0228     60BF        ABR,11,15
432     0229     E556        LDM,5,6        ZOAM
        022A  R  0763
433     022B     E7C0        BLM,12         STAMP
        022C  R  046D
434     022D     E7F0        BLM,15         TERLN
        022E  R  049A
435                       * PEAK DATA, PARAGRAPH B.
436     022F     ED50        LDI,5          |B.|           |B.|
        0230  A  422E
437     0231     E650        STM,5          M06S1+1
        0232  R  0584
438     0233     EDA0        LDI,10         M06S1+2
        0234  R  0585
439     0235     6C8B        ZRR,11
440     0236     ED50        LDI,5          12
        0237  A  000C
441     0238     E7F0        BLM,15         ABCNO          |PEAK|
        0239  R  0451
442                       * GET TIME FROM ONSET TO PEAK
443     023A     6D76        TRR,7,6
444     023B     2D71        LLS,7,1
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```
445   023C     E557      LDM,5,7      ZOTM
      023D  R  072B
446   023E     E650      STM,5        U.DTM
      023F  X  002C
447   0240     654F      LBR,4,15
448   0241     607F      ABR,7,15
449   0242     E557      LDM,5,7      ZOTM
      0243  R  072B
450   0244     E654      STM,5,4      U.DTM
      0245  X  002C
451   0246     617F      SBR,7,15
452   0247     E870      ADI,7        ZPTM
      0248  R  079B
453   0249     E670      STM,7        $+7
      024A  R  0250
454   024B     6D76      TRR,7,6
455   024C     ED60      LDI,6        14
      024D  A  000F
456   024E     E7E0      BLM,14       E:DIF
      024F  X  0031
457   0250  A  0000      DFC          0
458   0251     6600      NOP
459   0252     6600      NOP
460   0253     6D67      TRR,6,7
461   0254     ED70      LDI,7        #6
      0255  A  0006
462   0256     21C7      DVR,12,7
463   0257     6DCD      TRR,12,13
464   0258     E7E0      BLM,14       E:BDC
      0259  X  002F
465   025A     ED70      LDI,7        3
      025B  A  0003
466   025C     E7E0      BLM,14       OUTNO        THREE DIGIT TIME FROM ONSET
      025D  R  0490
467   025E     ED50      LDI,5        #2C
      025F  A  002C
468   0260     AF5A      SBX,5,10
469   0261     60BF      ABR,11,15
470   0262     E556      LDM,5,6      ZPAM
      0263  R  07B7
471   0264     E7C0      BLM,12       STAMP
      0265  R  046D
472   0266     E7F0      BLM,15       TERLN
      0267  R  049A
473                  * HALF RECOVERY DATA, PARAGRAPH C.
474   0268     ED50      LDI,5        |C.|          |C.|
      0269  A  432E
475   026A     E650      STM,5        M06S1+1
      026B  R  0584
476   026C     EDA0      LDI,10       M06S1+2
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        026D  R  0585
477     026E     6CBB        ZRR,11
478     026F     ED50        LDI,5          13
        0270  A  000D
479     0271     E7F0        BLM,15         ABCNO          |HALF|
        0272  R  0451
480                       * GET TIME FROM ONSET TO HALF RECOVERY
481     0273     6D76        TRR,7,6
482     0274     2D71        LLS,7,1
483     0275     E870        ADI,7          ZRTM
        0276  R  07C5
484     0277     E670        STM,7          $+7
        0278  R  027E
485     0279     6D76        TRR,7,6
486     027A     ED60        LDI,6          14
        027B  A  000E
487     027C     E7E0        BLM,14         E:DIF
        027D  X  0031
488     027E  A  0000        DFC            0
489     027F     6600        NOP
490     0280     6600        NOP
491     0281     6D67        TRR,6,7
492     0282     ED70        LDI,7          #6
        0283  A  0006
493     0284     21C7        DVR,12,7
494     0285     6DCD        TRR,12,13
495     0286     E7E0        BLM,14         E:BDC
        0287  X  002F
496     0288     ED70        LDI,7          3
        0289  A  0003
497     028A     E7E0        BLM,14         OUTNO          THREE DIGIT TIME FROM ONSET
        028B  R  0490
498     028C     ED50        LDI,5          #2C
        028D  A  002C
499     028E     AF5A        SBX,5,10
500     028F     60BF        ABR,11,15
501     0290     E556        LDM,5,6        ZRAM
        0291  R  07E1
502     0292     E7C0        BLM,12         STAMP
        0293  R  046D
503     0294     E7F0        BLM,15         TERLN
        0295  R  049A
504                       * DAT ABOUT SIGNAL ENDING, PARAGRAPH D.
505     0296     ED50        LDI,5          |D.|           |D.|
        0297  A  442E
506     0298     E650        STM,5          M06S1+1
        0299  R  0584
507     029A     EDA0        LDI,10         M06S1+2
        029B  R  0585
508     029C     6CBB        ZRR,11
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```
                        * DETERMINE HOW SIGNAL ENDED (HAPPY I HOPE)
 029D      8606          TBMB,0,6       ZEND,LTEND
 029E  R   086D
 029F  R   02DC
 02A0      8616          TBMB,1,6       ZEND,HREND
 02A1  R   086D
 02A2  R   02DF
 02A3      8626          TBMB,2,6       ZEND,NOND
 02A4  R   086D
 02A5  R   02E3
                        * FULL RECOVERY HERE.........
 02A6      ED50          LDI,5          14
 02A7  A   000E
 02A8      E7F0          BLM,15         ABCNO            |FULL|
 02A9  R   0451
 02AA      6D76          TRR,7,6
 02AB      2D71          LLS,7,1
 02AC      E870          ADI,7          ZFTM
 02AD  R   0843
 02AE      E670          STM,7          $+7
 02AF  R   02B5
 02B0      6D76          TRR,7,6
 02B1      ED60          LDI,6          14
 02B2  A   000E
 02B3      E7E0          BLM,14         E:DIF
 02B4  X   0031
 02B5  A   0000          DFC            0
 02B6      6600          NOP
 02B7      6600          NOP
 02B8      6D67          TRR,6,7
 02B9      ED70          LDI,7          #6
 02BA  A   0006
 02BB      21C7          DVR,12,7
 02BC      6DCD          TRR,12,13
 02BD      E7E0          BLM,14         E:BDC
 02BE  X   002F
 02BF      ED70          LDI,7          3
 02C0  A   0003
 02C1      E7E0          BLM,14         OUTNO            THREE DIGIT TIME FROM ONSET
 02C2  R   0490
 02C3      ED50  FRAMP   LDI,5          #2C
 02C4  A   002C
 02C5      AF5A          SBX,5,10
 02C6      60BF          ABR,11,15
 02C7      E556          LDM,5,6        ZFAM
 02C8  R   0827
 02C9      E7C0          BLM,12         STAMP
 02CA  R   046D
 02CB      8626          TBMB,2,6       ZEND,$+5
 02CC  R   086D
```

```
        02CD  R  02D0
539     02CE     E700          BRU            SFEND
        02CF  R  02D8
540     02D0     ED50          LDI,5          #2C
        02D1  A  002C
541     02D2     AF5A          SBX,5,10
542     02D3     60BF          ABR,11,15
543     02D4     ED50          LDI,5          23
        02D5  A  0017
544     02D6     E7F0          BLM,15         ABCNO          |SECOND ONSET|
        02D7  R  0451
545     02D8     E7F0   SFEND  BLM,15         TERLN
        02D9  R  049A
546     02DA     E700          BRU            PARAE
        02DB  R  02FD
547     02DC     ED50   LTEND  LDI,5          16             |LOST|
        02DD  A  0010
548     02DE     F703          HOP,$+3
549     02DF     ED50   HREND  LDI,5          15             |HOUR|
        02E0  A  000F
550     02E1     E7F0          BLM,15         ABCNO
        02E2  R  0451
551     02E3     E556   NOND   LDM,5,6        ZOFZ           ONSET VALUE
        02E4  R  0819
552     02E5     86F6          TBMB,15,6      ZODR,$+5
        02E6  R  077F
        02E7  R  02EA
553     02E8     E056          ADM,5,6        U.CCL
        02E9  X  0033
554     02EA     E156          SUM,5,6        ZFFZ           - CUR. VALUE
        02EB  R  0835
555     02EC     ED70          LDI,7          10
        02ED  A  000A
556     02EE     2047          MPR,4,7
557     02EF     2A44          RAD,4,4
558     02F0     6DC5          TRR,12,5
559     02F1     E7E0          BLM,14         E:BDC
        02F2  X  002F
560     02F3     ED70          LDI,7          3
        02F4  A  0003
561     02F5     E7E0          BLM,14         OUTNO          3 DIGIT DIFFERENCE
        02F6  R  0490
562     02F7     ED50          LDI,5          17
        02F8  A  0011
563     02F9     E7F0          BLM,15         ABCNO          |MICROSECONDS|
        02FA  R  0451
564     02FB     F700          BRU            FRAMP
        02FC  R  02C3
565                            * PARAGRAPH E: TRACK RATE, ONSET SIGMA, TYPE
566     02FD     ED50   PARAE  LDI,5          |E.|
```

```
        02FE  A  452E
567     02FF     E650        STM,5        M06S1+1        |E.|
        0300  R  0584
568     0301     EDA0        LDI,10       M06S1+2
        0302  R  0585
569     0303     6CBB        ZRR,11
570     0304     E556        LDM,5,6      ZTR
        0305  R  07FD
571     0306     E7F0        BLM,15       ABCNO          TRACK RATE
        0307  R  0451
572     0308     ED50        LDI,5        #2C
        0309  A  002C
573     030A     AF5A        SBX,5,10
574     030B     60BF        ABR,11,15
575     030C     E556        LDM,5,6      ZDSG           ONSET SIGMA
        030D  R  080B
576     030E     ED70        LDI,7        100
        030F  A  0064
577     0310     2047        MPR,4,7
578     0311     2A44        RAD,4,4
579     0312     6DC5        TRR,12,5
580     0313     E7E0        BLM,14       E:BDC
        0314  X  002F
581     0315     ED70        LDI,7        4
        0316  A  0004
582     0317     E7E0        BLM,14       OUTNO
        0318  R  0490
583     0319     ED50        LDI,5        17
        031A  A  0011
584     031B     E7F0        BLM,15       ABCNO          |MICROSECONDS|
        031C  R  0451
585     031D     ED50        LDI,5        #2C
        031E  A  002C
586     031F     AF5A        SBX,5,10
587     0320     60BF        ABR,11,15
588     0321     E546        LDM,4,6      ZTYPE
        0322  R  06D7
589     0323     6C55        ZRR,5
590     0324     ED30        LDI,3        -6
        0325  A  FFFA
591     0326     E7F0        BLM,15       STFCH
        0327  R  0462
592     0328     E7F0        BLM,15       TERLN
        0329  R  049A
593     032A     65F0        LBR,15,0
594     032B     E6F0        STM,15       E.28F
        032C  X  0011
595     032D     E7E0        BLM,14       E:028
        032E  X  0012
596     032F  R  054D        DFC          LEADS
```

```
597     0330     E700      BRU        E:SKD
        0331  X  002E
```

```
                        ****************************************************************
                        * HEADR SETS UP THE FIRST  FIVE LINES TO THE ASR 28.
                        *  THIS INCLUDES ALL DATA ABOUT THE CHANNEL:
                        *   1. CHAN DESIGNATOR (SHOWS PRIORITY)
                        *   2. FREQ AND TRANSMITTER CALL SIGN
                        *   3. TRACK RATE, GAIN, AND BLANK LEVEL
                        *   4. CARDIOID CONFIGURATION
                        *   5. SIGNAL TYPE
                        *   6. BACKGROUND LEVEL AT ONSET
 0332      E7E0  HEADR BLM,14        E:FRT          GET MESSAGE TIME
 0333   X  0001
 0334   R  04B8       DFC           MSG01+2
                        * READ DET NUMBER AND SET IT UP FOR OUTPUT
 0335      ED20       LDI,2         #400E
 0336   A  400E
 0337      432E       DCD,2,#E
 0338      4F4E       IDD,4,#E
 0339      0824       MBR,2,4
 033A      E820       ADI,2         #2030
 033B   A  2030
 033C      E620       STM,2         M01S1+2        | 5--|
 033D   R  04CF
 033E      0C44       MLR,4,4
 033F      2844       RLD,4,4
 0340      2D44       LLS,4,4
 0341      2C44       LLD,4,4
 0342      E840       ADI,4         #3030
 0343   A  3030
 0344      E640       STM,4         M01S1+3        | 515|
 0345   R  04D0
                        * SET UP RSD (REPORATABLE SIGNAL DESCRIPTOR) NUMBER.
 0346      E5C6       LDM,12,6      UDRNO
 0347   R  0611
 0348      E7E0       BLM,14        E:BAD          CONVERT TO DECIMAL
 0349   X  0002
 034A      ED50       LDI,5         E.BDF
 034B   X  0003
 034C      FD45       LDX,4,5
 034D      0944       MBL,4,4
 034E      E840       ADI,4         #0020
 034F   A  0020
 0350      E640       STM,4         M01S2+1        |--0 |
 0351   R  04D3
 0352      605E       ABR,5,14
 0353      FD45       LDX,4,5
 0354      0944       MBL,4,4
 0355      615F       SBR,5,15
 0356      F845       ADX,4,5
 0357      E640       STM,4         M01S2          |000 |
 0358   R  04D2
```

```
                        * DC CHANNEL DESIGNATOR......
0359      6D56          TRR,5,6
035A      E850          ADI,5          #2041          | A|
035B  A   2041
035C      E650          STM,5          M01S2+5
035D  R   04D7
                        * DO FREQ AND CALL LETTERS....
035E      ED10          LDI,1          -56
035F  A   FFC8
0360      6D76          TRR,7,6
0361      2D71          LLS,7,1
0362      E547          LDM,4,7        U.FRQ          R4,5=FREQUENCY
0363  X   0004
0364      E647          STM,4,7        ZFRQ
0365  R   06E5
0366      607F          ABR,7,15
0367      E557          LDM,5,7        U.FRQ
0368  X   0004
0369      E657          STM,5,7        ZFRQ
036A  R   06E5
036B      E640          STM,4          M01S3          STORE FREQ
036C  R   04DB
036D      E650          STM,5          M01S3+1
036E  R   04DC
036F      E521  HED02 LDM,2,1          CALTR+56
0370  R   060B
0371      E531          LDM,3,1        CALTR+57
0372  R   060C
0373      7C24          XORB,2,4       NXT01
0374  R   0387
0375      7C35          XORB,3,5       NXT01
0376  R   0387
0377      E521          LDM,2,1        CALTR+58
0378  R   060D
0379      E620          STM,2          M01S3+2        GET CALL LTRS.
037A  R   04DD
037B      617F          SBR,7,15
037C      E627          STM,2,7        CALLT
037D  R   0701
037E      E521          LDM,2,1        CALTR+59
037F  R   060E
0380      607F          ABR,7,15
0381      E627          STM,2,7        CALLT
0382  R   0701
0383      E620          STM,2          M01S3+3
0384  R   04DE
0385      F700          BRU            HED01
0386  R   0397
0387      701D  NXT01 ABRB,1,13        HED02
0388  R   036F
```

```
666   0389     ED20      LDI,2        | U|          IF NO MATCH FOUND,
      038A  A  2055
667   038B     617F      SBR,7,15
668   038C     F627      STM,2,7      CALLT            USE | UNK|
      038D  R  0701
669   038E     E620      STM,2        M01S3+2
      038F  R  04DD
670   0390     ED20      LDI,2        |NK|              FOR UNKNOWN
      0391  A  4E4B
671   0392     607F      ABR,7,15
672   0393     E627      STM,2,7      CALLT
      0394  R  0701
673   0395     E620      STM,2        M01S3+3
      0396  R  04DE
674                     * NOW, SET UP TRACK RATE, GAIN, AND BLANK LEVEL....
675   0397     E556  HED01 LDM,5,6    U.TRK
      0398  X  0005
676   0399     E656      STM,5,6      ZTR
      039A  R  07FD
677   039B     E850      ADI,5        #5230
      039C  A  5230
678   039D     E650      STM,5        M01S3+5        TRAKC RATE
      039E  R  04E0
679   039F     E556      LDM,5,6      U.GAN
      03A0  X  0006
680   03A1     6C44      ZRR,4
681   03A2     ED10      LDI,1        10
      03A3  A  000A
682   03A4     2141      DVR,4,1
683   03A5     E850      ADI,5        |NO|              *
      03A6  A  4E30
684   03A7     E650      STM,5        M01S3+7        GAIN
      03A8  R  04E2
685   03A9     0944      MBL,4,4
686   03AA     E840      ADI,4        |0:|
      03AB  A  303A
687   03AC     E640      STM,4        M01S3+8
      03AD  R  04E3
688   03AE     E556      LDM,5,6      U.BLL
      03AF  X  0007
689   03B0     6C44      ZRR,4
690   03B1     2141      DVR,4,1
691   03B2     0955      MBL,5,5
692   03B3     6854      ADR,5,4
693   03B4     E850      ADI,5        #3030
      03B5  A  3030
694   03B6     E650      STM,5        M01S3+10
      03B7  R  04E5
695                     * GET CARDICID PATTERN
696   03B8     E556      LDM,5,6      M.STA
```

```
        03B9  X  0008
697     03BA     E656        STM,5,6        ZSTA
        03BB  R  071D
698     03BC     6C44        ZRR,4
699     03BD     2D5A        LLS,5,10
700     03BE     2C43        LLD,4,3
701     03BF     E840        ADI,4          |DO|
        03C0  A  4430
702     03C1     E640        STM,4          MO1S3+13
        03C2  R  04E8
703                       * DETERMINE SIGNAL TYPE
704     03C3     E546        LDM,4,6        ZCLS
        03C4  R  06C9
705     03C5     714F        SBRB,4,15      CKCL2
        03C6  R  03D1
706     03C7     E546        LDM,4,6        ZODR
        03C8  R  077F
707     03C9     714F        SBRB,4,15      SETBR
        03CA  R  03CE
708     03CB     ED40        LDI,4          TYPEA          TYPE ALPHA
        03CC  R  0621
709     03CD     F70B        HOP,STYPE                      (CLASS=1,DIR=ADV)
710     03CE     ED40  SETBR LDI,4          TYPEB          TYPE BRAVO
        03CF  R  0624
711     03D0     F708        HOP,STYPE                      (CLASS=1,DIR=RET)
712     03D1     714F  CKCL2 SBRB,4,15      SETCO
        03D2  R  03D6
713     03D3     ED40        LDI,4          TYPED          TYPE DELTA
        03D4  R  062A
714     03D5     F703        HOP,STYPE                      (CLASS=2)
715     03D6     ED40  SETCO LDI,4          TYPEC          TYPE COCO, CLS=3
        03D7  R  0627
716     03D8     E646  STYPE STM,4,6        ZTYPE
        03D9  R  06D7
717     03DA     ED10        LDI,1          -3
        03DB  A  FFFD
718     03DC     FD24        LDX,2,4
719     03DD     E621        STM,2,1        MO1S4+3
        03DE  R  04F3
720     03DF     604F        ABR,4,15
721     03E0     701F        ABRB,1,15      STYPE+4        OUTPUT 3 CHAR TYPE ID
        03E1  R  03DC
722                       * SET UP ONSET STANDARD DEVIATION
723     03E2     E5C6        LDM,12,6       U.OSG
        03E3  X  000B
724     03E4     E6C6        STM,12,6       ZOSG
        03E5  R  080B
725     03E6     E6F0        STM,15         HR15
        03E7  R  03EC
726     03E8     E7F0        BLM,15         E:FMF
```

```
        03E9  X  000C
727     03EA  R  062D        DFC            TEMP
728     03EB     EDF0        LDI,15         0
        03EC  A  0000
729           R  03EC  HR15  EQU            $-1
730     03ED     ED30        LDI,3          -3
        03EE  A  FFFD
731     03EF     E543        LDM,4,3        TEMP+5
        03F0  R  0632
732     03F1     E643        STM,4,3        M01S5+3
        03F2  R  04FB
733     03F3     703F        ABRB,3,15      $-4
        03F4  R  03EF
734                       * NOW, OUTPUT THOSE 5 LINES........
735     03F5     6CEE        ZRR,14
736     03F6     E6E0        STM,14         E.28F
        03F7  X  0011
737     03F8     E7E0        BLM,14         E:028
        03F9  X  0012
738     03FA  R  04B6        DFC            MSG01
739     03FB     FF0F        BRX,15                        RETURN.
740                       ***************************************************************
741                       * LONGL SETS UP AND OUTPUTS A LONG LINE
742     03FC     E750  LONGL BLM,5          SHSET
        03FD  R  0435
743     03FE     ED10        LDI,1          | |
        03FF  A  2020
744     0400     E610        STM,1          M02S2          CLEAR TERMINATIOR
        0401  R  0520
745     0402     E530        LDM,3          TDIUR           DO DIURNAL.
        0403  R  0634
746     0404     ED10        LDI,1          #A
        0405  A  000A
747     0406     2021        MPR,2,1
748     0407     2A26        RAD,2,6
749     0408     603F        ABR,3,15
750     0409     2B31        RAS,3,1
751     040A     6DC3        TRR,12,3
752     040B     E7E0        BLM,14         E:BAD
        040C  X  0002
753     040D     E520        LDM,2          E.BSG
        040E  X  0032
754     040F     E620        STM,2          M02S2+1        | +------|
        0410  R  0521
755     0411     ED10        LDI,1          E.BDF
        0412  X  0003
756     0413     FD21        LDX,2,1
757     0414     0922        MBL,2,2
758     0415     E820        ADI,2          #20
        0416  A  0020
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```
759     0417      E620        STM,2          M02S2+4          | +----0 |
        0418  R   0524
760     0419      601F        ABR,1,15
761     041A      FD21        LDX,2,1
762     041B      0922        MBL,2,2
763     041C      E820        ADI,2          #2E
        041D  A   002E
764     041E      E620        STM,2          M02S2+3          | +--0.0 |
        041F  R   0523
765     0420      601E        ABR,1,14
766     0421      FD21        LDX,2,1
767     0422      0922        MBL,2,2
768     0423      611F        SBR,1,15
769     0424      F821        ADX,2,1
770     0425      E620        STM,2          M02S2+2          | +000.0 |
        0426  R   0522
771     0427      6C22  LOUT  ZRR,2
772     0428      E620        STM,2          E.28F
        0429  X   0011
773     042A      E7E0        BLM,14         E:028
        042B  X   0012
774     042C  R   0510        DFC            MSG02
775     042D      FF0F        BRX,15                          RETURN.
776                       ***************************************************************
777                       * SHRTL SETS UP AND OUTPUTS A SHORT LINE
778     042E      E750  SHRTL BLM,5          SHSET
        042F  R   0435
779     0430      6C22        ZRR,2
780     0431      E620        STM,2          M02S2            TERMINATE LINE
        0432  R   0520
781     0433      E700        BRU            LOUT
        0434  R   0427
782                       ******************************************************
783                       * SHSET SETS UP THE COMMON PART OF BOTH
784                       *   LONG AND SHORT LINES.
785     0435      E510  SHSET LDM,1          LINEN
        0436  R   0620
786     0437      E521        LDM,2,1        LLABE
        0438  R   060B
787     0439      E620        STM,2          MSG02+1
        043A  R   0511
788                       *  CONVERT TIME ELEMENT
789     043B      E7E0        BLM,14         E:FCT
        043C  X   000E
790     043D  R   0513        DFC            MSG02+3
791     043E      E5C0        LDM,12         TPHAS
        043F  R   0632
792     0440      6DEF        TRR,14,15                           SAVE R15
793     0441      E7F0        BLM,15         E:FMF            FORMAT PHASE
        0442  X   000C
```

```
794   0443  R  0518        DFC            MSG02+8
795   0444     6DFE        TRR,15,14
796   0445     E516        LDM,1,6        U.AMP          HOLD REAL AMP
      0446  X  0013
797   0447     E520        LDM,2          TAMP
      0448  R  0633
798   0449     E626        STM,2,6        U.AMP           SUPPLY AMP FOR OUTPUT
      044A  X  0013
799   044B     E7E0        BLM,14         E:FAM
      044C  X  000D
800   044D  R  051D        DFC            M02S1+4
801   044E     E616        STM,1,6        U.AMP          RESTORE REAL AMP
      044F  X  0013
802   0450     FF05        BRX,5                         RETURN
803                     ***************************************************************
804                     * ABCNO IS A SUBROUTINE TO CONVERT A NUMERIC DIGIT
805                     *   TO THE APPHABETIC REPRESENTATION.
806                     *   IT HAS BEEN EXTENDED TO OUTPUT OTHER |WORDS|
807                     *   AS WELL.
808                     * CALLING SEQUENCE:
809                     *     BLM,15         ABCNO
810                     *   WITH R5= NUMBER TO BE CONVERTED
811                     *            OR CODE FOR DESIRED WORD.
812                     *        R10,R11 = BYTE ADDRESS TO BEGIN STORAGE
813                     *  EXIT WITH R10,R11 UPDATED FOR NEXT USAGE.
814   0451     A540  ABCNO SFM,4          RPSV1
      0452  R  0635
815   0453     E545        LDM,4,5        NOTBL
      0454  R  065A
816   0455     6C55        ZRR,5
817   0456     AE74  ABCN1 LBX,7,4
818   0457     7D77        TRRB,7,7       $+3
      0458  R  045A
819   0459     F706        HOP,ABCRT
820   045A     AF7A        SBX,7,10
821   045B     605F        ABR,5,15
822   045C     60BF        ABR,11,15
823   045D     E700        BRU            ABCN1
      045E  R  0456
824   045F     A440  ABCRT LFM,4          RPSV1
      0460  R  0635
825   0461     FF0F        BRX,15
826                     ***************************************************************
827                     * STRCH STORES A FIXED NUMBER OF CHARACTERS IN THE OUTPUT
828                     *    LINE.
829                     *
830                     *     BLM,15        STRCH
831                     *   WITH R4=LOCATION OF FIRST CHAR
832                     *        R5= ZERO
833                     *        R3=-COUNT OF CHARS
```

```
                        *     RESGISTERS ARE RESTORED FOR RETUNR.
                        *       R10,R11 BYTE ADDR FOR STORAGE,
                        *          ARE UPDATED ON RETURN.
0462      A530          STRCH SFM,3          RPSV1
0463  R   0635
0464      AE74                LBX,7,4
0465      AF7A                SBX,7,10
0466      605F                ABR,5,15
0467      60BF                ABR,11,15
0468      703F                ABRB,3,15      STRCH+2
0469  R   0464
046A      A430                LFM,3          RPSV1
046B  R   0635
046C      FF0F                BRX,15
                        ***************************************************************
                        * STAMP TAKES THE NUMERIC AMPLITUDE, CONVERS IT TO
                        *   DB AND PUTS IT IN THE OUTPUT BUFFER
                        *     BLM,12         STAMP
                        *   WITH R5= VALUE
                        *        R10,R11 FOR STORAGE LOCATION
                        *           UPDATED ON RETURN.
046D      A540          STAMP SFM,4          RPSV2
046E  R   063C
046F      ED70                LDI,7          10
0470  A   000A
0471      2047                MPR,4,7                        AMP*100
0472      2A49                RAD,4,9                          /2048
0473      E950                SUI,5          20                -5 VOLTS
0474  A   0014
0475      6D6C                TRR,6,12
0476      6DC5                TRR,12,5
0477      E7E0                BLM,14         E:BDC
0478  X   002F
                        * OUTPUT SIGN....
0479      6DC6                TRR,12,6
047A      ED50                LDI,5          20
047B  A   0014
047C      E560                LDM,6          E.BSG
047D  X   0032
047E      E960                SUI,6          #202D
047F  A   202D
0480      7D66                TRRB,6,6       $+3
0481  R   0483
0482      605F                ABR,5,15
0483      E7F0                BLM,15         ABCNO          PLUS/MINUS
0484  R   0451
                        * 3 DIGIT OUTPUT,....
0485      ED70                LDI,7          2
0486  A   0002
0487      E7E0                BLM,14         OUTNO
```

```
        0488  R  0490
871     0489     ED50        LDI,5          22
        048A  A  0016
872     048B     E7F0        BLM,15         ABCNO          |DB|
        048C  R  0451
873     048D     A440        LFM,4          RPSV2
        048E  R  063C
874     048F     FF0C        BRX,12
875                       ***************************************************************
876                       *  CUTNO OUTPUTS THE NUMBER OF DIGITS SPECIFIED IN
877                       *    R7 FROM E.BDF+(R7) THRU E.BDF.
878                       *     BLM,14         OUTNO
879     0490     ED40  OUTNO LDI,4          E.BDF
        0491  X  0003
880     0492     6847        ADR,4,7
881     0493     614F        SBR,4,15                      FIRST CHAR.
882     0494     FD54        LDX,5,4
883     0495     E7F0        BLM,15         ABCNO
        0496  R  0451
884     0497     717F        SBRB,7,15      $-4
        0498  R  0493
885     0499     FF0E        BRX,14
886                       ***************************************************************
887                       * TERLN TERMINATES LINE AND OUTPUTS TO ASR 28
888     049A     6C55  TERLN ZRR,5
889     049B     AF5A        SBX,5,10
890     049C     60BF        ABR,11,15
891     049D     AF5A        SBX,5,10
892     049E     6550        LBR,5,0
893     049F     E650        STM,5          E.28F
        04A0  X  0011
894     04A1     E7E0        BLM,14         E:028
        04A2  X  0012
895     04A3  R  0582        DFC            MSG06
896     04A4     FF0F        BRX,15
897                       ***************************************************************
898                       * NXTLN IS A SUBROUTINE TO SET UP ANOTHER LINE IN
899                       *   THE CURRENT PARAGRAPH.
900                       *     BLM,14         NXTLN
901     04A5     ED50  NXTLN LDI,5          #0D                C/R
        04A6  A  000D
902     04A7     AF5A        SBX,5,10
903     04A8     60BF        ABR,11,15
904     04A9     ED50        LDI,5          #0A                L/F
        04AA  A  000A
905     04AB     AF5A        SBX,5,10
906     04AC     60BF        ABR,11,15
907     04AD     ED40        LDI,4          -4
        04AE  A  FFFC
908     04AF     ED50        LDI,5          #20                4 SPACES
```

```
        04B0  A  0020
909     04B1     AF5A        SBX,5,10
910     04B2     60BF        ABR,11,15
911     04B3     704F        ABRB,4,15      $-2
        04B4  R  04B1
912     04B5     FF0E        BRX,14
```

```
914                     ****************************************************************
915     04B6  A  0D0A   MSG01 DFC          #0D0A,#0A0A,|123 123456  |
        04B7  A  0A0A
        04B8  A  3132
        04B9  A  3320
        04BA  A  3132
        04BB  A  3334
        04BC  A  3536
        04BD  A  2020
916     04BE  A  5245         DFC          |REPORTABLE SIGNAL DESCRIPTION,|
        04BF  A  504F
        04C0  A  5254
        04C1  A  4142
        04C2  A  4C45
        04C3  A  2053
        04C4  A  4947
        04C5  A  4E41
        04C6  A  4C20
        04C7  A  4445
        04C8  A  5343
        04C9  A  5249
        04CA  A  5054
        04CB  A  494F
        04CC  A  4E2C
917     04CD  A  2044   M01S1 DFC          | DET 515|,#0D0A
        04CE  A  4554
        04CF  A  2035
        04D0  A  3135
        04D1  A  0D0A
918     04D2  A  3030   M01S2 DFC          |001 |,#0D0A,|CHAN A;FREQ |
        04D3  A  3120
        04D4  A  0D0A
        04D5  A  4348
        04D6  A  414E
        04D7  A  2041
        04D8  A  3B46
        04D9  A  5245
        04DA  A  5120
919     04DB  A  3137   M01S3 DFC          |17.8 NAA;TR7;GN23;BL47;CARD7|
        04DC  A  2E38
        04DD  A  204E
        04DE  A  4141
        04DF  A  3B54
        04E0  A  5237
        04E1  A  3B47
        04E2  A  4E32
        04E3  A  333B
        04E4  A  424C
        04E5  A  3437
        04E6  A  3B43
```

```
        04E7  A  4152
        04E8  A  4437
920     04E9  A  0D0A        DFC          #0D0A,|SIGNAL TYPE:|
        04EA  A  5349
        04EB  A  474E
        04EC  A  414C
        04ED  A  2054
        04EE  A  5950
        04EF  A  453A
921     04F0  A  2041  MO1S4 DFC          | ALPHA    SIGMA |
        04F1  A  4C50
        04F2  A  4841
        04F3  A  2020
        04F4  A  2020
        04F5  A  5349
        04F6  A  474D
        04F7  A  4120
922     04F8  A  3030  MO1S5 DFC          |00.75 |,#0D0A,|    DOY |
        04F9  A  2E37
        04FA  A  3520
        04FB  A  0D0A
        04FC  A  2020
        04FD  A  2020
        04FE  A  444F
        04FF  A  5920
923     0500  A  2054        DFC          | TIME    PHASE    AMP     DIUR|,0
        0501  A  494D
        0502  A  4520
        0503  A  2020
        0504  A  2050
        0505  A  4841
        0506  A  5345
        0507  A  2020
        0508  A  2020
        0509  A  414D
        050A  A  5020
        050B  A  2020
        050C  A  2020
        050D  A  4449
        050E  A  5552
        050F  A  0000
924     0510  A  0D0A  MSG02 DFC          #0D0A,|ON  123 123456 +|
        0511  A  4F4E
        0512  A  2020
        0513  A  3132
        0514  A  3320
        0515  A  3132
        0516  A  3334
        0517  A  3536
        0518  A  202B
```

```
925     0519  A  3030  M02S1 DFC          |0003.62  00.00|
        051A  A  3033
        051B  A  2E36
        051C  A  3220
        051D  A  2030
        051E  A  302E
        051F  A  3030
926     0520  A  2020  M02S2 DFC          |   +000.0 |,0
        0521  A  202B
        0522  A  3030
        0523  A  302E
        0524  A  3020
        0525  A  0000
927     0526  A  0D0A  MSG03 DFC          #0D0A,|OFFSET: |
        0527  A  4F46
        0528  A  4653
        0529  A  4554
        052A  A  3A20
928     052B  A  3031  M03S1 DFC          |0137.62 |,#0D0A,|ONSET RATE: |
        052C  A  3337
        052D  A  2E36
        052E  A  3220
        052F  A  0D0A
        0530  A  4F4E
        0531  A  5345
        0532  A  5420
        0533  A  5241
        0534  A  5445
        0535  A  3A20
929     0536  A  2030  M03S2 DFC          | 000.0|,0
        0537  A  3030
        0538  A  2E30
        0539  A  0000
930     053A  A  0D0A  MSG04 DFC          #0D0A,|SIGNAL TERMINATED:|
        053B  A  5349
        053C  A  474E
        053D  A  414C
        053E  A  2054
        053F  A  4552
        0540  A  4D49
        0541  A  4E41
        0542  A  5445
        0543  A  443A
931     0544  A  2053  M04S1 DFC          | SIGNAL LOST|,#0D0A,#0A0A,0
        0545  A  4947
        0546  A  4E41
        0547  A  4C20
        0548  A  4C4F
        0549  A  5354
        054A  A  0D0A
```

```
        054B  A  0A0A
        054C  A  0000
932     054D  A  0D0A  LEADS DFC          #0D0A,#0A0A,#0A0A
        054E  A  0A0A
        054F  A  0A0A
933     0550  A  0101  LEADR RES          25,#0101
934     0569  A  1F1F        DFC          #1F1F,0
        056A  A  0000
935     056B  A  0D0A  MSG05 DFC          #0D0A,#0A0A,| RSD|
        056C  A  0A0A
        056D  A  2052
        056E  A  5344
936     056F  A  0000  M05S1 RES          19,0
937     0582  A  0D0A  MSG06 DFC          #0D0A
938     0583  A  0000  M06S1 RES          80,0
```

```
940                     * TABLE TO ASSOCIATE TRANSMITTER CALL LETTERS WITH
941                     *  FREQUENCY.
942     05D3  A  3132   CALTR DFC          |12.0 MG4|
        05D4  A  2E30
        05D5  A  204D
        05D6  A  4734
943     05D7  A  3132         DFC          |12.2 MG1|
        05D8  A  2E32
        05D9  A  204D
        05DA  A  4731
944     05DB  A  3133         DFC          |13.1 MG3|
        05DC  A  2E31
        05DD  A  204D
        05DE  A  4733
945     05DF  A  3136         DFC          |16.0 GBR|
        05E0  A  2E30
        05E1  A  2047
        05E2  A  4252
946     05E3  A  3136         DFC          |16.4 JXZ|
        05E4  A  2E34
        05E5  A  204A
        05E6  A  585A
947     05E7  A  3137         DFC          |17.4 NDT|
        05E8  A  2E34
        05E9  A  204E
        05EA  A  4454
948     05EB  A  3137         DFC          |17.8 NAA|
        05EC  A  2E38
        05ED  A  204E
        05EE  A  4141
949     05EF  A  3138         DFC          |18.6 NPG|
        05F0  A  2E36
        05F1  A  204E
        05F2  A  5047
950     05F3  A  3139         DFC          |19.6 GBZ|
        05F4  A  2E36
        05F5  A  2047
        05F6  A  425A
951     05F7  A  3230         DFC          |20.0 WWV|
        05F8  A  2E30
        05F9  A  2057
        05FA  A  5756
952     05FB  A  3231         DFC          |21.4 NSS|
        05FC  A  2E34
        05FD  A  204E
        05FE  A  5353
953     05FF  A  3232         DFC          |22.3 NWC|
        0600  A  2E33
        0601  A  204E
        0602  A  5743
```

```
954     0603  A  3233        DFC            |23.4 NPM|
        0604  A  2E34
        0605  A  204E
        0606  A  504D
955     0607  A  3234        DFC            |24.0 NBA|
        0608  A  2E30
        0609  A  204E
        060A  A  4241
956                     * LINE LABELS....
957     060B  A  4F4E  LLABE DFC            |ONP1P2PKHRFR|
        060C  A  5031
        060D  A  5032
        060E  A  504B
        060F  A  4852
        0610  A  4652
958                     * RSD NUMBERS FOR SIGNALS IN PROGRESS...
959     0611  A  0000  UDRNO RES            14,0
960     061F  A  0001  U.UDR DFC            001            MASTER NUMBER
961     0620  A  0000  LINEN DFC            0              OUTPUT LINE ID
962     0621  A  2041  TYPEA DFC            | ALPHA|
        0622  A  4C50
        0623  A  4841
963     0624  A  2042  TYPEB DFC            | BRAVO|
        0625  A  5241
        0626  A  564F
964     0627  A  2043  TYPEC DFC            | COCO |
        0628  A  4F43
        0629  A  4F20
965     062A  A  2044  TYPED DFC            | DELTA|
        062B  A  454C
        062C  A  5441
966     062D  A  0000  TEMP  RES            5,0
967     0632  A  0000  TPHAS RES            1,0
968     0633  A  0000  TAMP  RES            1,0
969     0634  A  0000  TDIUR RES            1,0
970     0635  A  0000  RPSV1 RES            7,0
971     063C  A  0000  RPSV2 RES            6,0
972     0642  A  204E  END1  DFC            | NORMALLY   |
        0643  A  4F52
        0644  A  4D41
        0645  A  4C4C
        0646  A  5920
        0647  A  2020
973     0648  A  2054  END2  DFC            | TIME LAPSE |
        0649  A  494D
        064A  A  4520
        064B  A  4C41
        064C  A  5053
        064D  A  4520
974     064E  A  2053  END3  DFC            | SIGNAL LOST|
```

```
        064F  A  4947
        0650  A  4E41
        0651  A  4C20
        0652  A  4C4F
        0653  A  5354
 975    0654  A  204E  END4  DFC          | NEW ONSET  |
        0655  A  4557
        0656  A  204F
        0657  A  4E53
        0658  A  4554
        0659  A  2020
 976    065A  R  0672  NOTBL DFC          NO0            ZERO
 977    065B  R  0675        DFC          NO1            ONE
 978    065C  R  0678        DFC          NO2            TWO
 979    065D  R  067B        DFC          NO3            THREE
 980    065E  R  067F        DFC          NO4            FOUR
 981    065F  R  0682        DFC          NO5            FIVE
 982    0660  R  0685        DFC          NO6            SIX
 983    0661  R  0688        DFC          NO7            SEVEN
 984    0662  R  068C        DFC          NO8            EIGHT
 985    0663  R  0690        DFC          NO9            NINE
 986    0664  R  0693        DFC          NO10           FRONT
 987    0665  R  0697        DFC          NO11           BACK
 988    0666  R  069A        DFC          NO12           PEAK
 989    0667  R  069D        DFC          NO13           HALF
 990    0668  R  06A0        DFC          NO14           FULL
 991    0669  R  06A3        DFC          NO15           HOUR
 992    066A  R  06A6        DFC          NO16           LOST
 993    066B  R  06A9        DFC          NO17           MICROSECOND
 994    066C  R  06B0        DFC          NO18           ADVANCE
 995    066D  R  06B5        DFC          NO19           RETARD
 996    066E  R  06B9        DFC          NO20           PLUS
 997    066F  R  06BC        DFC          NO21           MINUS
 998    0670  R  06C0        DFC          NO22           DB
 999    0671  R  06C2        DFC          NO23           SECOND ONSET
1000                        ***********************************************************
1001    0672  A  205A  NO0   DFC          | ZER|,#4F00
        0673  A  4552
        0674  A  4F00
1002    0675  A  204F  NO1   DFC          | ONE|,0
        0676  A  4E45
        0677  A  0000
1003    0678  A  2054  NO2   DFC          | TWO|,0
        0679  A  574F
        067A  A  0000
1004    067B  A  2054  NO3   DFC          | THREE|,0
        067C  A  4852
        067D  A  4545
        067E  A  0000
1005    067F  A  2046  NO4   DFC          | FOU|,#5200
```

```
        0680  A  4F55
        0681  A  5200
1006    0682  A  2046  NO5   DFC          | FIV|,#4500
        0683  A  4956
        0684  A  4500
1007    0685  A  2053  NO6   DFC          | SIX|,0
        0686  A  4958
        0687  A  0000
1008    0688  A  2053  NO7   DFC          | SEVEN|,0
        0689  A  4556
        068A  A  454E
        068B  A  0000
1009    068C  A  2045  NO8   DFC          | EIGHT|,0
        068D  A  4947
        068E  A  4854
        068F  A  0000
1010    0690  A  204E  NO9   DFC          | NIN|,#4500
        0691  A  494E
        0692  A  4500
1011    0693  A  2046  NO10  DFC          | FRONT|,0
        0694  A  524F
        0695  A  4E54
        0696  A  0000
1012    0697  A  2042  NO11  DFC          | BAC|,#4B00
        0698  A  4143
        0699  A  4B00
1013    069A  A  2050  NO12  DFC          | PEA|,#4B00
        069B  A  4541
        069C  A  4B00
1014    069D  A  2048  NO13  DFC          | HAL|,#4600
        069E  A  414C
        069F  A  4600
1015    06A0  A  2046  NO14  DFC          | FUL|,#4C00
        06A1  A  554C
        06A2  A  4C00
1016    06A3  A  2048  NO15  DFC          | HOU|,#5200
        06A4  A  4F55
        06A5  A  5200
1017    06A6  A  204C  NO16  DFC          | LOS|,#5400
        06A7  A  4F53
        06A8  A  5400
1018    06A9  A  204D  NO17  DFC          | MICROSECOND|,#5300
        06AA  A  4943
        06AB  A  524F
        06AC  A  5345
        06AD  A  434F
        06AE  A  4E44
        06AF  A  5300
1019    06B0  A  2041  NO18  DFC          | ADVANCE|,0
        06B1  A  4456
```

```
        06B2  A  414E
        06B3  A  4345
        06B4  A  0000
1020    06B5  A  2052  NO19  DFC          | RETAR|,#4400
        06B6  A  4554
        06B7  A  4152
        06B8  A  4400
1021    06B9  A  2050  NO20  DFC          | PLU|,#5300
        06BA  A  4C55
        06BB  A  5300
1022    06BC  A  204D  NO21  DFC          | MINUS|,0
        06BD  A  494E
        06BE  A  5553
        06BF  A  0000
1023    06C0  A  2044  NO22  DFC          | D|,#4200
        06C1  A  4200
1024    06C2  A  2053  NO23  DFC          | SECOND ONSE|,#5400
        06C3  A  4543
        06C4  A  4F4E
        06C5  A  4420
        06C6  A  4F4E
        06C7  A  5345
        06C8  A  5400
```

```
1026    06C9  A  0000  ZCLS   RES        14,0        U.CLS
1027    06D7  A  0000  ZTYPE  RES        14,0        POINTS TO TYPE
1028    06E5  A  0000  ZFRQ   RES        28,0        U.FRQ
1029    0701  A  0000  CALLT  RES        28,0        COMPUTES
1030    071D  A  0000  ZSTA   RES        14,0        M.STA
1031    072B  A  0000  ZOTM   RES        28,0        U.OTM
1032    0747  A  0000  ZOTB   RES        28,0        U.OTB
1033    0763  A  0000  ZOAM   RES        14,0        U.OAM
1034    0771  A  0000  ZOST   RES        14,0        W.OST
1035    077F  A  0000  ZODR   RES        14,0        U.ODR
1036    078D  A  0000  ZONR   RES        14,0        W.ONR
1037    079B  A  0000  ZPTM   RES        28,0        W.PTM
1038    07B7  A  0000  ZPAM   RES        14,0        W.PAM
1039    07C5  A  0000  ZRTM   RES        28,0        W.RAM
1040    07E1  A  0000  ZRAM   RES        14,0        W.RAM
1041    07EF  A  0000  ZRFZ   RES        14,0        W.RFZ
1042    07FD  A  0000  ZTR    RES        14,0        U.TRK
1043    080B  A  0000  ZOSG   RES        14,0        U.OSG
1044    0819  A  0000  ZOFZ   RES        14,0        U.OFZ
1045    0827  A  0000  ZFAM   RES        14,0        U.AMP
1046    0835  A  0000  ZFFZ   RES        14,0        U.LFZ
1047    0843  A  0000  ZFTM   RES        28,0        U.LTM
1048    085F  A  0000  INPRG  RES        14,0
1049    086D  A  0000  ZEND   RES        14,0
1050    087B                  END

TOTAL ASSEMBLY ERRORS =   0    SIZE =  2171
```

```
                                PGM          U$RED
                                 INT          U:RED
                                 EXT          U.CST,U.AST,U.TRK,U.DIU,E:SKD
                                 EXT          E:028,E.28F,E:LOG,U.FRQ,U.IHB
                                 EXT          E:FRT,M.STA
                           *     CAT NO.  400100-007
                           * U$RED CHECKS FOR CHANNELS ON THE SAME FREQUENCY.
                           *   THOSE WHICH ARE, ARE COMPARED FOR CRITICAL
                           *   PROCESSING PARAMETER IDENTITY.  THE LEVELS OF
                           *   CHECKING ARE:
                           *     1.  CHANNEL STATUS (U.CST)
                           *     2.  ANALYSIS STATUS (U.AST)
                           *     3.  TRACKING RATES (U.TRK)
                           *     4.  DIURNAL SLOPE (U.DIU)
0000        6C66           U:RED ZRR,6                          1ST CHAN POINTER
0001        E660                 STM,6          FLAG            RESET FLAG WORD
0002   R    00C9
0003        8606           RED02 TBMB,0,6       U.IHB,RED01     SKIP CHAN IF INHIBITED
0004   X    000A
0005   R    0071
0006        6D76                 TRR,7,6
0007        607F                 ABR,7,15                       START 2ND CHAR AT 1ST + 1
0008        8607           RED04 TBMB,0,7       U.IHB,RED03     SKIP CHAN IF INHIBITED
0009   X    000A
000A   R    006C
                           * WE HAVE 2 UNHIBITED CHANS, LET'S SEE IF THEY'RE
                           *   ON THE SAME FREQUENCY.
000B        6D16                 TRR,1,6
000C        2D11                 LLS,1,1
000D        6D27                 TRR,2,7
000E        2D21                 LLS,2,1
000F        E531                 LDM,3,1        U.FRQ
0010   X    0009
0011        E132                 SUM,3,2        U.FRQ
0012   X    0009
0013        7D33                 TRRB,3,3       RED03           BRU IF NOT SAME
0014   R    006C
0015        601F                 ABR,1,15
0016        602F                 ABR,2,15
0017        E531                 LDM,3,1        U.FRQ
0018   X    0009
0019        E132                 SUM,3,2        U.FRQ
001A   X    0009
001B        7D33                 TRRB,3,3       RED03           TENTHS NOT SAME
001C   R    006C
                           * IF EITHER CHANNEL HAS NO CARDIOID, IT WILL MATCH
                           *   THE OTHER; IF BOTH DO, THEY MUST BE ON THE SAME
                           *   PATH.
001D        E536                 LDM,3,6        M.STA
001E   X    000C
```

```
39      001F      EA30        ETI,3         #FFC7
        0020  A   FFC7
40      0021      EC30        XOI,3         #0038
        0022  A   0038
41      0023      7D33        TRRB,3,3      $+4
        0024  R   0027
42      0025      E700        BRU           RED05          CHAN IN 6 NONE
        0026  R   0036
43      0027      E537        LDM,3,7       M.STA
        0028  X   000C
44      0029      EA30        ETI,3         #FFC7
        002A  A   FFC7
45      002B      EC30        XOI,3         #0038
        002C  A   0038
46      002D      7D33        TRRB,3,3      $+3
        002E  R   0030
47      002F      F707        HOP,RED05                    CHAN IN 7 NONE
48                          * NOW, MAKE SURE BOTH OF THESE CHANNELS ARE MONITORING
49                          *   THE SAME PATH.
50      0030      E536        LDM,3,6       M.STA
        0031  X   000C
51      0032      E437        XOM,3,7       M.STA
        0033  X   000C
52      0034      763A        TBRB,3,10     RED03
        0035  R   006C
53                          * WE HAVE NOW ASCERTAINED THAT THE CHANS IN R6 AND
54                          *   R7 ARE ON THE SAME FREQUENCY.  LET'S CHECK AND
55                          *   SEE IF THEY ARE AT THE SAME LEVEL OF PROCESSING.
56                          * THE CHAN STATUS SHOULD BE THE SAME (U.CST)
57      0036      8210      RED05 OBMM,1        FLAG
        0037  R   00C9
58      0038      E536        LDM,3,6       U.CST
        0039  X   0001
59      003A      E137        SUM,3,7       U.CST
        003B  X   0001
60      003C      7D33        TRRB,3,3      FLEV1          BRU ON FAILURE
        003D  R   0084
61                          * THE ANALYSIS STATUS SHOULD BE THE SAME (U.AST)
62      003E      E536        LDM,3,6       U.AST
        003F  X   0002
63      0040      E137        SUM,3,7       U.AST
        0041  X   0002
64      0042      7D33        TRRB,3,3      FLEV2          BRU ON FAILURE
        0043  R   0088
65                          * THE DIFFERENCE IN TRACKING RATES SHOULD BE
66                          *   SMALL.
67      0044      E536        LDM,3,6       U.TRK
        0045  X   0003
68      0046      E137        SUM,3,7       U.TRK
        0047  X   0003
```

```
69    0048     7630        TBRB,3,0      $+3
      0049  R  004B
70    004A     F702        HOP,$+2
71    004B     6F33        TTR,3,3
72    004C     E930        SUI,3         #3
      004D  A  0003
73    004E     7630        TBRB,3,0      $+4
      004F  R  0052
74    0050     E700        BRU           FLEV3
      0051  R  008C
75                     * THE DIFFERENCE IN DIURNAL ESTIMATES SHOULD
76                     *   LIKEWISE BE SMALL.
77                     * IF THE NOISE LEVEL IS SUFFICIENT TO REQUIRE LOW
78                     *   TRACK RATES. THE VALUE OF COMPARING DIURNALS IS
79                     *   QUESTIONABLE, SC WE WON'T.
80    0052     E536        LDM,3,6       U.TRK
      0053  X  0003
81    0054     E930        SUI,3         5                (MUST BE > 4)
      0055  A  0005
82    0056     7630        TBRB,3,0      REDO3            TOO LOW
      0057  R  006C
83    0058     E537        LDM,3,7       U.TRK
      0059  X  0003
84    005A     E930        SUI,3         5
      005B  A  0005
85    005C     7630        TBRB,3,0      REDO3            TOO LOW
      005D  R  006C
86    005E     E536        LDM,3,6       U.DIU
      005F  X  0004
87    0060     E137        SUM,3,7       U.DIU
      0061  X  0004
88    0062     7630        TBRB,3,0      $+3
      0063  R  0065
89    0064     F702        HOP,$+2
90    0065     6F33        TTR,3,3
91    0066     E930        SUI,3          #D
      0067  A  000D
92    0068     7630        TBRB,3,0       REDO3           ALL LEVELS PASS
      0069  R  006C
93    006A     E700        BRU            FLEV4
      006B  R  0090
94    006C     607F  REDO3 ABR,7,15                       NEXT 2ND CHANNEL
95    006D     ED10        LDI,1          14
      006E  A  000E
96    006F     7917        SURB,1,7       REDO4
      0070  R  0008
97    0071     606F  REDO1 ABR,6,15                       NEXT 1ST CHANNEL
98    0072     ED10        LDI,1          13
      0073  A  000D
99    0074     7916        SURB,1,6       REDO2
```

```
        0075  R  0003
100     0076     8610        TBMB,1          FLAG,$+5
        0077  R  00C9
        0078  R  007B
101     0079     E700        BRU             E:SKD          NO MATCHES
        007A  X  0005
102     007B     8600        TBMB,0          FLAG,E:SKD     FAILURES FOUND
        007C  R  00C9
        007D  X  0005
103                       * SUCCESSFUL MATCHES FOUND, GENERATE LOG MSG.
104     007E     ED50        LDI,5           #1306
        007F  A  1306
105     0080     E740        BLM,4           E:LOG
        0081  X  0008
106     0082     E700        BRU             E:SKD
        0083  X  0005
107     0084     ED10  FLEV1 LDI,1           #C001
        0085  A  C001
108     0086     E700        BRU             MSGUP
        0087  R  0092
109     0088     ED10  FLEV2 LDI,1           #C002
        0089  A  C002
110     008A     E700        BRU             MSGUP
        008B  R  0092
111     008C     ED10  FLEV3 LDI,1           #C003
        008D  A  C003
112     008E     E700        BRU             MSGUP
        008F  R  0092
113     0090     ED10  FLEV4 LDI,1           #C004
        0091  A  C004
114     0092     E610  MSGUP STM,1           FLAG
        0093  R  00C9
115     0094     E7E0        BLM,14          E:FRT
        0095  X  000B
116     0096  R  00AF        DFC             FMSG+1
117     0097     0911        MBL,1,1
118     0098     E810        ADI,1           #3020
        0099  A  3020
119     009A     E610        STM,1           FMSG+25
        009B  R  00C7
120     009C     6D16        TRR,1,6
121     009D     E810        ADI,1           #2041
        009E  A  2041
122     009F     E610        STM,1           FMSG+16
        00A0  R  00BE
123     00A1     6D17        TRR,1,7
124     00A2     E810        ADI,1           #2041
        00A3  A  2041
125     00A4     E610        STM,1           FMSG+19
        00A5  R  00C1
```

```
126     00A6      6C11        ZRR,1
127     00A7      E610        STM,1          E.28F
        00A8  X   0007
128     00A9      E7E0        BLM,14         E:028
        00AA  X   0006
129     00AB  R   00AE        DFC            FMSG
130     00AC      E700        BRU            RED03
        00AD  R   006C
131     00AE  A   0D0A  FMSG  DFC            #0D0A,|123 123456  RED FAILURE,|
        00AF  A   3132
        00B0  A   3320
        00B1  A   3132
        00B2  A   3334
        00B3  A   3536
        00B4  A   2020
        00B5  A   5245
        00B6  A   4420
        00B7  A   4641
        00B8  A   494C
        00B9  A   5552
        00BA  A   452C
132     00BB  A   2043        DFC            | CHANS A AND B ON LEVEL 1 |,0
        00BC  A   4841
        00BD  A   4E53
        00BE  A   2041
        00BF  A   2041
        00C0  A   4E44
        00C1  A   2042
        00C2  A   204F
        00C3  A   4E20
        00C4  A   4C45
        00C5  A   5645
        00C6  A   4C20
        00C7  A   3120
        00C8  A   0000
133     00C9  A   0000  FLAG  DFC            0
134     00CA                  END

TOTAL ASSEMBLY ERRORS =   0    SIZE =   202
```

```
                          PGM          U$PST
                           INT          U:PST
                           EXT          U.GAN,U.TRK,U.BLL,E.35I,E.IOF
                           EXT          E:035,U:CNI,E:SKD,E:MIT,E:LOG
                     *     CAT NO.  400100-004
                     * THIS PROGRAM ALLOWS THE OPERATOR TO MAKE NEEDED AJUSTMENTS TO
                     *   THE TRACK RATE, GAIN, AND BLANKING LEVEL BY TYPING IN THE
                     *   DESIRED VALUE FOR EACH ON THE ASR 35 TELETYPEWRITER.  THE
                     *   MACHINE RESPONDS BY EITHER CARRYING OUT THE DESIRED FUNCTION
                     *   OR EXPLANING WHY IT COULDN'T.
                     * THE OPERATOR CALLING SEQUENCE IS....... OPC: (HE THEN TYPES)
                     *   A THRU N FOLLOWED BY A COMMA FOR CHANNEL DESIGNATION,
                     *   A SINGLE LETTER FOR FUNCTION;  B = BLANKING CHANGE
                     *                                  G = GAIN CHANGE
                     *                                  T = TRACKING RATE CHANGE
                     *   THIS FUNCTION SHOULD BE FOLLOWED BY A COMMA, AND A
                     *   TWO DIGIT VALUE. (SHOULD BE POSITIVE AND WITHIN THE
                     *   FOLLOWING LIMITS)  B = 00 THRU 63
                     *                      G = 00 THRU 24
                     *                      T = 00 THRU 09
                     *           THE TWO DIGIT VALUE SHOULD BE FOLLOWED BY A CR.
                     ***************************************************************
                     ***************************************************************
                     *********                                         ***************
                     *********    EXAMPLE:    OPC:B,G,08               ***************
                     *********                                         ***************
                     ***************************************************************
                     ***************************************************************
0000      ED10   U:PST LDI,1         E.35I          GET CHANNEL
0001   X  0004
0002      601D         ABR,1,13
0003      FD61         LDX,6,1
0004      E960         SUI,6         #41            CONVERT LETTER TO NUMBER
0005   A  0041
0006      7660         TBRB,6,0      GOOF1
0007   R  000D
0008      6D56         TRR,5,6                          AND HOLD IN R6
0009      E950         SUI,5         14             IS CHANNEL NUMBER OK?
000A   A  000E
000B      7650         TBRB,5,0      MAYI           IF YES CHECK FOR SIGNAL IN PROGRESS
000C   R  0015
000D      6C22   GOOF1 ZRR,2
000E      E620         STM,2         E.IOF
000F   X  0005
0010      E7E0         BLM,14        E:035          IF NO   SAY SO...
0011   X  0006
0012   R  00BD         DFC           ILLCH
0013      E700         BRU           E:SKD
0014   X  0008
                     ***********************************************************
```

```
                        *** SO MUCH FOR THE CHANNEL NUMBER CHECKER MESS......   ****
                        ************************************************************
0015      E7F0  MAYI  BLM,15        U:CNI        SIGNAL IN PROGRESS?
0016  X   0007
0017      E700        BRU           NOGO            YES???...NO CHANGES PLEASE
0018  R   0047
0019      601F        ABR,1,15                      NO????...GET FUNCTION
001A      E7E0        BLM,14        COMCK
001B  R   0057
001C      FDA1        LDX,10,1
001D      E9A0        SUI,10        #42          DOES HE WANT BLANKING CHANGE?
001E  A   0042
001F      7DAA        TRRB,10,10    $+4          ...NEGATIVE....
0020  R   0023
0021      E700        BRU           BVAL         ...ROGER.....
0022  R   0091
0023      E9A0        SUI,10        #5           DOES HE WANT A GAIN CHANGE?
0024  A   0005
0025      7DAA        TRRB,10,10    $+4          ...NEGATIVE AGAIN...
0026  R   0029
0027      E700        BRU           GVAL         THAT'S WHAT THE MAN WANTS
0028  R   00AB
0029      E9A0        SUI,10        #D           EITHER HE WANTS A TRACK RATE CHANGE
002A  A   000D
002B      7DAA        TRRB,10,10    NOFUN        ......OR HE HIT THE WRONG KEY.
002C  R   004F
002D      E7A0        BLM,10        VALPK        GO GET THE VALUE
002E  R   006F
002F      E630        STM,3         PARAM
0030  R   00A5
0031      E930        SUI,3         10           IS TR VALUE OK?
0032  A   000A
0033      7630        TBRB,3,0      $+4          ....YES..CONTINUE
0034  R   0037
0035      E700        BRU           OOPS         ....NO...THEN SAY SO
0036  R   003F
0037      E520        LDM,2         PARAM
0038  R   00A5
0039      E626        STM,2,6       U.TRK
003A  X   0002
003B      ED70        LDI,7         03
003C  A   0003
003D      E700        BRU           OUTGO        YOUR ON YOUR WAY
003E  R   00A1
003F      6C22  OOPS  ZRR,2
0040      E620        STM,2         E.IOF
0041  X   0005
0042      E7E0        BLM,14        E:035        ILLEGAL VALUE MESSAGE
0043  X   0006
0044  R   00F8        DFC           ILLVL
```

```
71    0045      E700        BRU          E:SKD
      0046  X   0008
72    0047      6C22  NOGO  ZRR,2
73    0048      E620        STM,2        E.IOF
      0049  X   0005
74    004A      E7E0        BLM,14       E:035        OUTPUT MESSAGE TO OPER.
      004B  X   0006
75    004C  R   00C8        DFC          NOPAR        .....SIG IN PROGRESS.....
76    004D      E700        BRU          E:SKD        TOO BAD, MAYBE NEXT TIME
      004E  X   0008
77    004F      6C22  NOFUN ZRR,2
78    0050      E620        STM,2        E.IOF
      0051  X   0005
79    0052      E7E0        BLM,14       E:035        ILLEGAL FUNCTION MESSAGE
      0053  X   0006
80    0054  R   00DF        DFC          ILFUN
81    0055      E700        BRU          E:SKD        TRY AGAIN SOME OTHER TIME
      0056  X   0008
82    0057      FDB1  COMCK LDX,11,1                  GET NEXT CHAR
83    0058      E9B0        SUI,11       #2C          IS IT A COMMA
      0059  A   002C
84    005A      7DBB        TRRB,11,11   $+4
      005B  R   005E
85    005C      601F        ABR,1,15                  YES....
86    005D      FF0E        BRX,14
87    005E      6C22        ZRR,2                     NO, LOG INVALID FORMAT
88    005F      E620        STM,2        E.IOF
      0060  X   0005
89    0061      E7E0        BLM,14       E:035
      0062  X   0006
90    0063  R   0107        DFC          INFMT
91    0064      E700        BRU          E:SKD        RETURN
      0065  X   0008
92    0066      7640  NUMCK TBRB,4,0     OOPS         NUMBER TOO LOW, SAY SO
      0067  R   003F
93    0068      E940        SUI,4        10
      0069  A   000A
94    006A      7640        TBRB,4,0     $+4          NUMBER TOO HIGH, SAY SO
      006B  R   006E
95    006C      E700        BRU          OOPS
      006D  R   003F
96    006E      FF0E        BRX,14
```

```
                        * VALPK CHECKS THE VALUE REQUESTED FOR A NEG VALUE, AND IF IT
                        *   IS NEGATIVE, OUTPUTS A MESSAGE SAYING SO.  IF THE VALUE IS
                        *   ZERO OR GREATER IT CONVERTS THE VALUE TO BINARY.
     006F      601F    VALPK ABR,1,15                      GET FIRST CHAR.
     0070      E7E0          BLM,14        COMCK
     0071  R   0057
     0072      FD31          LDX,3,1
     0073      6D43          TRR,4,3                     SAVE R2
     0074      E940          SUI,4         #2D
     0075  A   002D
     0076      7D44          TRRB,4,4      NOTNG         IS CHAR |-|?
     0077  R   007F
     0078      E640          STM,4         E.IOF
     0079  X   0005
     007A      E7E0          BLM,14        E:035         ....YES...
     007B  X   0006
                        *          TELL SOMEONE ABOUT IT
     007C  R   00EA          DFC           ILVAL
     007D      E700          BRU           E:SKD
     007E  X   0008
     007F      E930    NOTNG SUI,3         #30           ********************************
     0080  A   0030
     0081      6D43          TRR,4,3                     *                              *
     0082      E7E0          BLM,14        NUMCK         *                              *
     0083  R   0066
     0084      EDB0          LDI,11        10            * CONVERSION TO BINARY ROUTINE *
     0085  A   000A
     0086      203B          MPR,3,11                    *                              *
     0087      601F          ABR,1,15                    * VALUE=(1ST DIGIT-#30)*10     *
     0088      FD41          LDX,4,1                     *                              *
     0089      E940          SUI,4         #30           *                              *
     008A  A   0030
     008B      E7E0          BLM,14        NUMCK         *                              *
     008C  R   0066
     008D      F831          ADX,3,1                     *             +(2ND DIGIT-#30) *
     008E      E930          SUI,3         #30           ********************************
     008F  A   0030
     0090      FF0A          BRX,10
     0091      E7A0    BVAL  BLM,10        VALPK         CONVERT VALUE TO BIN. HOLD IN R2
     0092  R   006F
     0093      E630          STM,3         PARAM         SAVE VALUE
     0094  R   00A5
     0095      E930          SUI,3         64            IS BLANKING LEVEL OK?
     0096  A   0040
     0097      7630          TBRB,3,0      $+4           ...YES....CONTINUE
     0098  R   009B
     0099      E700          BRU           OOPS          ...NO.....THEN SAY SO
     009A  R   003F
     009B      E520          LDM,2         PARAM
     009C  R   00A5
```

```
130     009D      E626        STM,2,6       U.BLL        SET BLANKING LEVEL TO NEW VALUE
        009E  X   0003
131     009F      ED70        LDI,7         05
        00A0  A   0005
132     00A1      0956  OUTGO MBL,5,6                    SET LEFT BYTE OF R5 TO CHANNEL
133     00A2      6857        ADR,5,7                    SET RIGHT BYTE OF R5 TO MESSAGE NO.
134     00A3      E740        BLM,4         E:LCG
        00A4  X   000A
135     00A5  A   0000  PARAM DFC           0            OUTPUT LOG MESSAGE
136     00A6      6D36  SEND  TRR,3,6
137     00A7      E750        BLM,5         E:MIT
        00A8  X   0009
138     00A9      E700        BRU           E:SKD
        00AA  X   0008
139     00AB      E7A0  GVAL  BLM,10        VALPK        CONVERT VALUE TO BINARY
        00AC  R   006F
140     00AD      E630        STM,3         PARAM        SAVE VALUE
        00AE  R   00A5
141     00AF      E930        SUI,3         25           IS GAIN CHANGE VALUE OK?
        00B0  A   0019
142     00B1      7630        TBRB,3,0      $+4          ...YES....CONTINUE
        00B2  R   00B5
143     00B3      E700        BRU           OOPS         ...NO.....THEN SAY SO
        00B4  R   003F
144     00B5      E520        LDM,2         PARAM
        00B6  R   00A5
145     00B7      E626        STM,2,6       U.GAN        SET GAIN TO NEW VALUE
        00B8  X   0001
146     00B9      ED70        LDI,7         04
        00BA  A   0004
147     00BB      E700        BRU           OUTGO
        00BC  R   00A1
```

```
149                     * CLEVER LITTLE MESSAGES TO LET THE OPERATOR IN ON WHAT'S HAPPENING
150     00BD  A  0D0A   ILLCH DFC          #0D0A,|INVALID CHANNEL |,#0D0A,#0000
        00BE  A  494E
        00BF  A  5641
        00C0  A  4C49
        00C1  A  4420
        00C2  A  4348
        00C3  A  414E
        00C4  A  4E45
        00C5  A  4C20
        00C6  A  0D0A
        00C7  A  0000
151     00C8  A  0D0A   NOPAR DFC          #0D0A,|NO PARM. CHANGE PERMITTED, SIG. IN PROG.|
        00C9  A  4E4F
        00CA  A  2050
        00CB  A  4152
        00CC  A  4D2E
        00CD  A  2043
        00CE  A  4841
        00CF  A  4E47
        00D0  A  4520
        00D1  A  5045
        00D2  A  524D
        00D3  A  4954
        00D4  A  5445
        00D5  A  442C
        00D6  A  2053
        00D7  A  4947
        00D8  A  2E20
        00D9  A  494E
        00DA  A  2050
        00DB  A  524F
        00DC  A  472E
152     00DD  A  0D0A         DFC          #0D0A,#0000
        00DE  A  0000
153     00DF  A  0D0A   ILFUN DFC          #0D0A,|INVALID FUNCTION|,#0D0A,#0000
        00E0  A  494E
        00E1  A  5641
        00E2  A  4C49
        00E3  A  4420
        00E4  A  4655
        00E5  A  4E43
        00E6  A  5449
        00E7  A  4F4E
        00E8  A  0D0A
        00E9  A  0000
154     00EA  A  0D0A   ILVAL DFC          #0D0A,|CANNOT USE NEG. VALUES|,#0D0A,#0000
        00EB  A  4341
        00EC  A  4E4E
        00ED  A  4F54
```

```
        00EE  A  2055
        00EF  A  5345
        00F0  A  204E
        00F1  A  4547
        00F2  A  2E20
        00F3  A  5641
        00F4  A  4C55
        00F5  A  4553
        00F6  A  0D0A
        00F7  A  0000
 155    00F8  A  0D0A  ILLVL DFC          #0D0A,|VALUE NOT WITHIN LIMITS |,#0D0A,#0000
        00F9  A  5641
        00FA  A  4C55
        00FB  A  4520
        00FC  A  4E4F
        00FD  A  5420
        00FE  A  5749
        00FF  A  5448
        0100  A  494E
        0101  A  204C
        0102  A  494D
        0103  A  4954
        0104  A  5320
        0105  A  0D0A
        0106  A  0000
 156    0107  A  0D0A  INFMT DFC          #0D0A,|INVALID FORMAT|,#0D0A,#0000
        0108  A  494E
        0109  A  5641
        010A  A  4C49
        010B  A  4420
        010C  A  464F
        010D  A  524D
        010E  A  4154
        010F  A  0D0A
        0110  A  0000
 157    0111                 END

TOTAL ASSEMBLY ERRORS =   0    SIZE =   273
```

```
 1                          PGM          M$ESC
 2                           INT          M:INT,M.TM1,M:ESC,M.STA
 3                           EXT          E:SKD,E:LOG,U.IHB,U.CST,U.RTY
 4                           EXT          U.END,U.CLS,U.TRF,U.OTM
 5                           EXT          U.CCN,U.TRL
 6                      * M:INT IS THE INTERRUPT ROUTINE ENTERED WHEN THE OPERATOR CHANGES
 7                      *   A RECEIVER FREQUENCY OR CARDIOID CONFIGURATION, OR CHANGES EITHER
 8                      *   THE MAINTENANCE OR AUTO/MANUAL SWITCHES, OR THE SENSORS DISCOVER
 9                      *   AN INE CONDITION.  THE ROUTINE SETS A FIVE SECOND TIMER IN THE
10                      *   SYSTEM CLOCK ROUTINE.  WHEN THE TIMER RUNS OUT, M:ESC IS SCHEDULED.~
11     0000     E620   M:INT STM,2         $+7            SAVE R2
       0001  R  0007
12     0002     ED20        LDI,2         -5
       0003  A  FFFB
13     0004     E620        STM,2         M.TM1          SET M.TM1=5
       0005  R  00AD
14     0006     ED20        LDI,2         0              RESTORE R2
       0007  A  0000
15     0008     2500        CIR                          CLEAR INTERRUPT AND RETURN
16                      * M:ESC IS THE EQUIPMENT STATUS CHANGE MONITOR ROUTINE.  THIS ROUTINE
17                      *   CHECKS THE STATUS OF FREQUENCY, CARDIOID, INE, MAINTENANCE, AND
18                      *   AUTO/MANUAL FOR EACH CHANNEL AND LOGS THE NEW VALUE ON THE ASR 28.
19                      *   ANY PROCESSING STATUS CHANGES WHICH MAY RESULT FROM THE EQUIPMENT
20                      *   STATUS ARE ASLO MADE.
21     0009     ED20   M:ESC LDI,2         -14            SET UP TO READ DATA
       000A  A  FFF2
22     000B     ED50        LDI,5         #4350          INIT COMMANDS
       000C  A  4350
23     000D     E650        STM,5         READ1           OCD COMMANDS
       000E  R  0015
24     000F     ED50        LDI,5         #4F30
       0010  A  4F30
25     0011     E650        STM,5         READ2           IDD COMMAND
       0012  R  0016
26     0013     ED50        LDI,5         #4000          CONTROL WORD
       0014  A  4000
27     0015     4350   READ1 OCD,5,0
28     0016     4F30   READ2 IDD,3,0
29     0017     EC30        XOI,3         #FFFC
       0018  A  FFFC
30     0019     E632        STM,3,2       INWRD+14       STORE DATA IN BUFFER
       001A  R  00CA
31     001B     80F0        ABMM,15       READ1          UPDATE OCD
       001C  R  0015
32     001D     80F0        ABMM,15       READ2          UPDATE IDD
       001E  R  0016
33     001F     605F        ABR,5,15                     UPDATE CONTROL WORD
34     0020     702F        ABRB,2,15     READ1          LOOP THRU 14 CHANNELS
       0021  R  0015
35     0022     ED20        LDI,2         -14            CHANNEL POINTER
```

```
        0023  A  FFF2
 36     0024     E532  ESC2  LDM,3,2       INWRD+14        R3=NEW VALUE FOR THIS CHANNEL
        0025  R  00CA
 37     0026     E562        LDM,6,2       SVWRD+14        R6=PREVIOUS VALUE FOR THIS CHAN.
        0027  R  00BC
 38     0028     7C63        XORB,6,3      ESC1            BR. IF ANYTHING'S BEEN CHANGED
        0029  R  002E
 39     002A     702F  ESC3  ABRB,2,15     ESC2             NEXT CHANNEL
        002B  R  0024
 40     002C     E700        BRU           E:SKD           RETURN TO SYSTEM
        002D  X  0001
 41                        * CHANGE IN STATUS FOUND ON THIS CHANNEL.  NOW TRY TO FIND WHAT'S BEEN
 42                        *   CHANGED TO LOG IT.
 43                        * LAYOUT OF STATUS WORD IS....
 44                        *   BIT 0-9..FREQUENCY SETTING (9'S COMPLEMENT)
 45                        *   BIT 10-12..CARDIOID CONFIGURATION
 46                        *   BIT 13.....INE
 47                        *   BIT 14.....MAINTENANCE
 48                        *   BIT 15.....AUTO/MANUAL
 49     002E     E632  ESC1  STM,3,2       SVWRD+14        REPLACE OLD VLAUE WITH NEW
        002F  R  00BC
 50     0030     766F        TBRB,6,15     CHAUM           BRANCH IF AUTO MANUAL CHANGED
        0031  R  003E
 51     0032     766E  ESC4  TBRB,6,14     CHMAI           BRANCH IF MAINTENANCE MODE CHANGED
        0033  R  0049
 52     0034     766D  ESC5  TBRB,6,13     CHINE           BRANCH IF INE STATUS CHANGED
        0035  R  005C
 53     0036     6C77  ESC6  ZRR,7
 54     0037     2866        RLD,6,6                       SHIFT CARDIOID DETECTOR TO R7
 55     0038     7D77        TRRB,7,7      CHCAR           BRANCH IF CARDIOID CHANGED
        0039  R  006F
 56     003A     7D66  ESC7  TRRB,6,6      CHFRQ           BRANCH IF FREQUENCY CHANGED
        003B  R  007D
 57     003C     E700        BRU           ESC3             GO ON TO NEXT CHANNEL CHECK
        003D  R  002A
 58                        * CHANGE DETECT IN AUTO/MANUAL SWITCH,  CHECK TO SEE WHICH WAY CHANGED.~
 59     003E     0952  CHAUM MBL,5,2                       SET UP CHAN. DESIGNATOR FOR E:LOG
 60     003F     E850        ADI,5         #0E08
        0040  A  0E08
 61     0041     763F        TBRB,3,15     $+3
        0042  R  0044
 62     0043     605F        ABR,5,15                      MAKE MSG. NO. 9 IF NOW AUTO
 63     0044     E740        BLM,4         E:LOG
        0045  X  0002
 64     0046     626F        ZBR,6,15
 65     0047     E700        BRU           ESC4
        0048  R  0032
 66                        * CHANGE DETECTED IN MAINTENANCE MODE
 67     0049     0952  CHMAI MBL,5,2                       CHANNEL INDICATOR
 68     004A     E850        ADI,5         #0E0A           SET UP CHANNEL MSG. FOR E:LOG
```

```
        004B  A  0E0A
 69     004C     0845        MBR,4,5                        GET CHANNEL POINTER
 70     004D     763E        TBRB,3,14      ESC10-2         GOING IN OR COMING OUT OF MAINT.
        004E  R  0055
 71     004F     605F        ABR,5,15                       MAKE MSG. NO. 11 IF NOW OUT OF MAINT.
 72     0050     763D        TBRB,3,13      ESC10           DO NOT RESET IF INE STILL ON
        0051  R  0057
 73     0052     E770        BLM,7          RESET           RESET PARAMETERS TO ALLOW CHAN UP
        0053  R  00A2
 74     0054     F703        HOP,$+3
 75     0055     E770        BLM,7          REST2           SET INHIBIT FLAG FOR NEW MAINT COND
        0056  R  008B
 76     0057     E740  ESC10 BLM,4          E:LOG           LOG MAINT. CHANGE
        0058  X  0002
 77     0059     626E        ZBR,6,14                       RESET MAINT. DETECTION BIT
 78     005A     E700        BRU            ESC5            RETURN
        005B  R  0034
 79                    * CHANGE IN INE STATUS FOUND
 80     005C     0952  CHINE MBL,5,2
 81     005D     E850        ADI,5          #0E0C           SET UP CHAN/MSG NO. FOR E:LOG
        005E  A  0E0C
 82     005F     0845        MBR,4,5                        SET CHANNEL POINTER
 83     0060     763D        TBRB,3,13      ESC11-2         GOING IN OR COMING OUT OF INE
        0061  R  0068
 84     0062     605F        ABR,5,15                       MAKE MSG. NO. 13 IF NOW OUT OF INE
 85     0063     763E        TBRB,3,14      ESC11           DO NOT RESET IF STILL IN MAINT.
        0064  R  006A
 86     0065     E770        BLM,7          RESET           RESET PARMS AND ALLOW CHAN TO COME UP
        0066  R  00A2
 87     0067     F703        HOP,$+3
 88     0068     E770        BLM,7          REST2           SET INHIBIT FLAG FOR NEW INE
        0069  R  008B
 89     006A     E740  ESC11 BLM,4          E:LOG           LOG INE CHANGE
        006B  X  0002
 90     006C     626D        ZBR,6,13                       RESET THE DETECTION BIT
 91     006D     E700        BRU            ESC6            RETURN
        006E  R  0036
 92                    * CHANGE IN CARDIOID CONFIGURATION FOUND
 93     006F     6D53  CHCAR TRR,5,3                        GET NEW VALUE
 94     0070     2953        RLS,5,3
 95     0071     EA50        ETI,5          #FFF8
        0072  A  FFF8
 96     0073     E650        STM,5          ESC9
        0074  R  007A
 97     0075     0952        MBL,5,2
 98     0076     E850        ADI,5          #0E02
        0077  A  0E02
 99     0078     E740        BLM,4          E:LOG
        0079  X  0002
100     007A  A  0000  ESC9  DFC            0
```

```
101     007B      E700        BRU          ESC7
        007C  R   003A
102                       * FREQUENCY SETTING CHANGE FOUND
103     007D      6D53  CHFRQ TRR,5,3
104     007E      E650        STM,5        ESC8
        007F  R   0088
105     0080      0952        MBL,5,2
106     0081      E850        ADI,5        #0E01
        0082  A   0E01
107     0083      0845        MBR,4,5
108     0084      E770        BLM,7        REST1        RESET PARMS TO ALLOW NEW CHAN UP
        0085  R   00A4
109     0086      E740        BLM,4        E:LOG        LOG NEW FREQ SETTING
        0087  X   0002
110     0088  A   0000  ESC8  DFC          0
111     0089      E700        BRU          ESC3         GO TO NEXT CHAN
        008A  R   002A
112     008B      8204  REST2 OBMM,0,4     U.IHB        SET INHIBIT BIT
        008C  X   0003
113     008D      6CAA        ZRR,10
114     008E      E6A4        STM,10,4     U.END        RESET PROCESSING PARAMETERS
        008F  X   0006
115     0090      E6A4        STM,10,4     U.CLS
        0091  X   0007
116     0092      E6A4        STM,10,4     U.TRF
        0093  X   0008
117     0094      E6A4        STM,10,4     U.CCN
        0095  X   000A
118     0096      6D1A        TRR,1,10
119     0097      2D11        LLS,1,1
120     0098      E6A1        STM,10,1     U.OTM
        0099  X   0009
121     009A      601F        ABR,1,15
122     009B      E6A1        STM,10,1     U.OTM
        009C  X   0009
123     009D      F707        HOP,REST1
124     009E      EDA0        LDI,10       5
        009F  A   0005
125     00A0      E6A4        STM,10,4     U.TRL
        00A1  X   000B
126     00A2      8104  RESET ZBMM,0,4     U.IHB        RESET CHAN PROCESSING INHIBIT FLAG
        00A3  X   0003
127     00A4      ED10  REST1 LDI,1        4
        00A5  A   0004
128     00A6      E614        STM,1,4      U.CST        SET CHANNEL STATUS DOWN (4)
        00A7  X   0004
129     00A8      ED10        LDI,1        -18
        00A9  A   FFEE
130     00AA      E614        STM,1,4      U.RTY        RESET RECOVERY TALLY TO -10
        00AB  X   0005
```

```
 131     00AC      FF07        BRX,7                        RETURN
 132     00AD  A   0000  M.TM1 DFC          0              DELAY TIMER
 133           R   00AE  M.STA EQU          $
 134     00AE  A   0000  SVWRD RES          14,0           CURRENT STATUS VALUES
 135     00BC  A   0000  INWRD RES          14,0           INPUT STATUS VALUES
 136     00CA                  END

TOTAL ASSEMBLY ERRORS =   0    SIZE =   202
```

```
                                PGM          M$LEV
                                 INT          M:LEV
                                 EXT          E:FRT,E:028,E:BAD,E:SKD,E.TM3
                                 EXT          M.UPT,M.TRT,M.GNT,E.BDF,E.28F
                          *      CAT NO.  400000-010
                          * M$LEV EXAMINES THE DATA COLLECTED BY E$MIN AND COMPUTES STATISTICAL
                          *   INFORMATION FOR EACH CHANNEL WHICH THE OPERATOR WILL USE TO
                          *   DETERMINE PATH RELIABILITY.
                          * OUTPUT INCLUDES A CHANNEL BY CHANNEL LISTING OF:
                          *      1. PERCENT OF TIME CHANNEL WAS UP
                          *      2. PERCENT OF UP TIME CHANNEL WAS AT EACH TRACK RATE
                          *      3. PERCENT OF UP TIME CHANNEL WAS AT EACH GAIN SETTING
0000        E7E0          M:LEV BLM,14       E:FRT          GET CURRENT DOY/TIME GROUP
0001   X    0001
0002   R    00C2                 DFC          LINE1+1
0003        ED20                 LDI,2        #400E
0004   A    400E
0005        432E                 OCD,2,#E
0006        4F4E                 IDD,4,#E                    READ DET NO.
0007        0824                 MBR,2,4
0008        E820                 ADI,2        #2030
0009   A    2030
000A        E620                 STM,2        LINE1+18       UPPER HALF
000B   R    00D3
000C        0C44                 MLR,4,4
000D        2844                 RLD,4,4
000E        2D44                 LLS,4,4
000F        2C44                 LLD,4,4
0010        E840                 ADI,4        #3030
0011   A    3030
0012        E640                 STM,4        LINE1+19
0013   R    00D4
0014        6C22                 ZRR,2
0015        E620                 STM,2        E.28F
0016   X    000A
0017        E7E0                 BLM,14       E:028          OUTPUT FIRST LINE
0018   X    0002
0019   R    00BF                 DFC          LINE0
001A        ED20                 LDI,2        #5550          LABEL UP TIME LINE
001B   A    5550
001C        E620                 STM,2        BUFFR+1
001D   R    0108
001E        6C22                 ZRR,2                       R2 FOR CHAN POINTER (0 - 13)
001F        6C33                 ZRR,3                       R3 FOR OUTPUT BUFFER POINTER
0020        E540                 LDM,4        E.TM3          DIVISOR TO DETERMINE PRCNT UP TIME
0021   X    0005
0022        E630                 STM,3        E.TM3          RESET SYSTEM TIMER
0023   X    0005
0024        ED50                 LDI,5        100            R5 SCALE TO PERCENT (MPY*100)
0025   A    0064
```

```
38    0026      E5D2  LEV01 LDM,13,2      M.UPT          GET UP TIME VALUE FOR CHANNEL
      0027  X   0006
39    0028      20C5        MPR,12,5                     PERCENT=(M.UPT*100/E.TM1)
40    0029      21C4        DVR,12,4
41    002A      2FC1        LAS,12,1
42    002B      69C4        SUR,12,4
43    002C      76C0        TBRB,12,0     $+3
      002D  R   002F
44    002E      60DF        ABR,13,15
45    002F      6DCD        TRR,12,13
46    0030      E6C2        STM,12,2      UPFLG          STORE VALUE FOR LATER USE
      0031  R   0126
47    0032      E7E0        BLM,14        E:BAD          CONVERT VALUE TO BCD
      0033  X   0003
48    0034      E7E0        BLM,14        LPACK          STORE CHARS FOR OUTPUT
      0035  R   009B
49    0036      602F        ABR,2,15                     MOVE POINTER TO NEXT CHANNEL
50    0037      EDB0        LDI,11        14
      0038  A   000E
51    0039      79B2        SURB,11,2     LEV01          LOOP UNTIL LAST CHANNEL IS DONE
      003A  R   0026
52    003B      E7E0        BLM,14        E:028          LOG LINE OF PERCENT UP TIMES
      003C  X   0002
53    003D  R   0107        DFC           BUFFR
54                    * NOW ATTACK TRACK RATES AND GAINS
55    003E      E7E0        BLM,14        E:028          OUTPUT TRACK RATE TO TTY
      003F  X   0002
56    0040  R   00F6        DFC           LINE2
57    0041      ED70        LDI,7         100            R7 = 100
      0042  A   0064
58    0043      ED10        LDI,1         10             R1 = INCREMENTAL VALUE BETWEEN CHANS~
      0044  A   000A
59    0045      6C44        ZRR,4                        R4 VALUE POINTER
60    0046      8100        ZBMM,0        LFLAG          SET FLAG = 0 FOR TRACK RATE
      0047  R   0134
61    0048      ED50        LDI,5         #A
      0049  A   000A
62    004A      E650        STM,5         ENDVL          SET END VALUE FOR TR SETTING = 10
      004B  R   0135
63    004C      ED50        LDI,5         M.TRT          BASE OF TRACK RATE TABLE
      004D  X   0007
64    004E      6C22  LEV02 ZRR,2                        R2 IS CHANNEL POINTER
65    004F      6C33        ZRR,3                        R3 IS OUTPUT BUFFER POINTER
66    0050      6DB5        TRR,11,5                     TABLE POINTER FOR THIS SETTING
67    0051      6DC4        TRR,12,4                     OUTPUT NEW LEVEL
68    0052      E8C0        ADI,12        #2030
      0053  A   2030
69    0054      E6C0        STM,12        BUFFR+1        STORE IN OUTPUT BUFFER
      0055  R   0108
70    0056      E5C2  LEV03 LDM,12,2      UPFLG
```

```
          0057  R  0126
   71     0058     7DCC        TRRB,12,12     $+3            WAS CHANNEL UP AT ALL
          0059  R  005B
   72     005A     F70C        HOP,LEV04                      NO, OUTPUT '0'
   73     005B     FDDB        LDX,13,11                      GET VALUE OF M.GNT FOR CHANNEL
   74     005C     20C7        MPR,12,7                             *100
   75     005D     A1C2        DVM,12,2       M.UPT                 /M.UPT
          005E  X  0006
   76     005F     2FC1        LAS,12,1
   77     0060     E1C0        SUM,12         M.UPT
          0061  X  0006
   78     0062     76C0        TBRB,12,0      $+3
          0063  R  0065
   79     0064     60DF        ABR,13,15
   80     0065     6DCD        TRR,12,13
   81     0066     E7E0  LEV04 BLM,14         E:BAD          CONVERT TO ASCII DECIMAL
          0067  X  0003
   82     0068     E7E0        BLM,14         LPACK          PACK AND STORE FOR OUTPUT
          0069  R  009B
   83     006A     68B1        ADP,11,1                      MOVE TABLE POINTER TO NEXT CHANNEL
   84     006B     602F        ABR,2,15                      MOVE POINTER TO NEXT CHANNEL
   85     006C     EDA0        LDI,10         14
          006D  A  000E
   86     006E     79A2        SURB,10,2      LEV03          DO NEXT CHANNEL AT THIS LEVEL
          006F  R  0056
   87     0070     E7E0        BLM,14         E:028
          0071  X  0002
   88     0072  R  0107        DFC            BUFFR
   89     0073     605F        ABR,5,15                      MOVE BASE POINTER FOR NEXT SETTING
   90     0074     604F        ABR,4,15                      INCREMENT SETTING
   91     0075     6DA4        TRR,10,4
   92     0076     E1A0        SUM,10         ENDVL          LOOP TILL LAST SETTING DONE
          0077  R  0135
   93     0078     7DAA        TRRB,10,10     LEV02
          0079  R  004E
   94     007A     8600        TBMB,0         LFLAG,LEV05
          007B  R  0134
          007C  R  008D
   95     007D     8200        OBMM,0         LFLAG          SET FLAG BIT FOR GAIN
          007E  R  0134
   96     007F     E7E0        BLM,14         E:028          OUTPUT 'GAIN' TO TTY
          0080  X  0002
   97     0081  R  00FE        DFC            LINE3
   98     0082     ED10        LDI,1          8              INCREMENTAL VALUE BETWEEN CHANNELS
          0083  A  0008
   99     0084     6C44        ZRR,4                         RESET VALUE
  100     0085     ED50        LDI,5          #8
          0086  A  0008
  101     0087     E650        STM,5          ENDVL          SET END VALUE FOR GAIN = 8
          0088  R  0135
```

```
102     0089      ED50        LDI,5          M.GNT
        008A  X   0008
103     008B      E700        BRU            LEV02
        008C  R   004E
104     008D      ED20  LEV05 LDI,2          265
        008E  A   0109
105     008F      6C33        ZRP,3
106     0090      E632  LEV06 STM,3,2        M.TRT
        0091  X   0007
107     0092      712F        SBRB,2,15      LEV06
        0093  R   0090
108     0094      E630        STM,3          M.TRT
        0095  X   0007
109     0096      E7E0        BLM,14         E:028
        0097  X   0002
110     0098  R   0103        DFC            TERMN
111     0099      E700        BRU            E:SKD
        009A  X   0004
112                         * LPACK TAKES OUTPUT FROM E$BAD AND PACKS IT IN ASCII CHARS FOR M$LEV
113                         *   IN THE OUTPUT BUFFER.
114     009B      ED60  LPACK LDI,6          4                R6 IS CHAR POINTER
        009C  A   0004
115     009D      716F  LPCK  SBRB,6,15      $+3
        009E  R   00A0
116     009F      F70B        HOP,LPCK1
117     00A0      EDC0        LDI,12         -#30
        00A1  A   FFD0
118     00A2      E5D6        LDM,13,6       E.BDF
        00A3  X   0009
119     00A4      78CD        ADRB,12,13     LPCK1
        00A5  R   00AA
120     00A6      81B6        ZBMM,11,6      E.BDF            CHANGE LEADING 0 TO A SPACE CHAR
        00A7  X   0009
121     00A8      E700        BRU            LPCK
        00A9  R   009D
122     00AA      ED60  LPCK1 LDI,6          3                R6 IS CHAR POINTER AGAIN
        00AB  A   0003
123     00AC      E5C6        LDM,12,6       E.BDF            GET FIRST CHAR
        00AD  X   0009
124     00AE      09CC        MBL,12,12                             TO LEFT BYTE
125     00AF      616F        SBR,6,15
126     00B0      E0C6        ADM,12,6       E.BDF            GET SECOND CHAR TO RIGHT BYTE
        00B1  X   0009
127     00B2      E6C3        STM,12,3       BUFFR+2          STORE FOR OUTPUT
        00B3  R   0109
128     00B4      616F        SBR,6,15
129     00B5      E5C6        LDM,12,6       E.BDF            GET 3RD CHAR.
        00B6  X   0009
130     00B7      09CC        MBL,12,12                             TO LEFT BYTE
131     00B8      616F        SBR,6,15
```

```
132     00B9      E0C6        ADM,12,6      E.BDF          GET LAST CHAR IN RIGHT BYTE
        00BA  X   0009
133     00BB      E6C3        STM,12,3      BUFFR+3        STORE FOR OUTPUT
        00BC  R   010A
134     00BD      603E        ABR,3,14                     SET UP FOR NEXT OUTPUT
135     00BE      FF0E        BRX,14                       RETURN
136     00BF  A   0D0A  LINE0 DFC           #0D0A,#0A0A
        00C0  A   0A0A
137     00C1  A   0A0A  LINE1 DFC           #0A0A,|123 123456  PARA|
        00C2  A   3132
        00C3  A   3320
        00C4  A   3132
        00C5  A   3334
        00C6  A   3536
        00C7  A   2020
        00C8  A   5041
        00C9  A   5241
138     00CA  A   4D45        DFC           |METER HISTORY, DET 515|
        00CB  A   5445
        00CC  A   5220
        00CD  A   4849
        00CE  A   5354
        00CF  A   4F52
        00D0  A   592C
        00D1  A   2044
        00D2  A   4554
        00D3  A   2035
        00D4  A   3135
139     00D5  A   0D0A        DFC           #0D0A,#0A43,|HAN A   B   C   D   E   F   G |
        00D6  A   0A43
        00D7  A   4841
        00D8  A   4E20
        00D9  A   4120
        00DA  A   2020
        00DB  A   4220
        00DC  A   2020
        00DD  A   4320
        00DE  A   2020
        00DF  A   4420
        00E0  A   2020
        00E1  A   4520
        00E2  A   2020
        00E3  A   4620
        00E4  A   2020
        00E5  A   4720
140     00E6  A   2020        DFC           |  H   I   J   K   L   M   N |,#0D0A,#0000
        00E7  A   4820
        00E8  A   2020
        00E9  A   4920
        00EA  A   2020
```

```
          00EB  A  4A20
          00EC  A  2020
          00ED  A  4B20
          00EE  A  2020
          00EF  A  4C20
          00F0  A  2020
          00F1  A  4D20
          00F2  A  2020
          00F3  A  4E20
          00F4  A  0D0A
          00F5  A  0000
 141      00F6  A  0D0A  LINE2 DFC          #0D0A,#0D0A,|TRACK RATE|,#0000
          00F7  A  0D0A
          00F8  A  5452
          00F9  A  4143
          00FA  A  4B20
          00FB  A  5241
          00FC  A  5445
          00FD  A  0000
 142      00FE  A  0D0A  LINE3 DFC          #0D0A,#0D0A,|GAIN|,#0000
          00FF  A  0D0A
          0100  A  4741
          0101  A  494E
          0102  A  0000
 143      0103  A  0D0A  TERMN DFC          #0D0A,#0A0A,#0A0A,0
          0104  A  0A0A
          0105  A  0A0A
          0106  A  0000
 144      0107  A  0D0A  BUFFR DFC          #0D0A
 145      0108                 RES          29
 146      0125  A  0000        DFC          #0000
 147      0126  A  0000  UPFLG RES          14,0
 148      0134  A  0000  LFLAG DFC          0              BIT 0=0 FOR TR, =1 FOR GAIN
 149      0135  A  0000  ENDVL DFC          0
 150      0136                 END

TOTAL ASSEMBLY ERRORS =   0     SIZE =    310
```

```
                                PGM          M$STD
                                 INT          M:STD,E:FAM
                                 EXT          E:FRT,E:028,E.28F,E:BAD,E.BSG
                                 EXT          E.BDF,E:FMF,U.GAN,U.TRK,U.BLL
                                 EXT          U.SIG,U.DIU,U.AMP,M.STA,U.FRQ
                                 EXT          U.IHB,E:SKD,U.CST
                          *      CAT NO.  400000-017
                          *M$STD PROVIDES A CHANNEL BY CHANNEL LIST OF ALL
                          *   IMPORTANT RECEIVER AND PROCESSING PARAMETERS.
                          *   THIS LIST IS LOGGED ON THE ASR 28.
0000      E7E0            M:STD BLM,14       E:FRT          SET DAY/TIME GROUP
0001  X   0001
0002  R   0135                  DFC          LINE1+1
0003      ED20                  LDI,2        #400E
0004  A   400E
0005      432E                  OCD,2,#E
0006      4F4E                  IDD,4,#E                    READ DET NO.
0007      0824                  MBR,2,4
0008      E820                  ADI,2        #2030
0009  A   2030
000A      E620                  STM,2        LINE1+21       UPPER HALF
000B  R   0149
000C      0C44                  MLR,4,4
000D      2844                  RLD,4,4
000E      2D44                  LLS,4,4
000F      2C44                  LLD,4,4
0010      E840                  ADI,4        #3030
0011  A   3030
0012      E640                  STM,4        LINE1+22       LOWER HALF
0013  R   014A
0014      6C22                  ZRP,2
0015      E620                  STM,2        E.28F
0016  X   0003
0017      E7E0                  BLM,14       E:028          WRITE 2 LINES
0018  X   0002
0019  R   0133                  DFC          LINE0
001A      6C66                  ZRR,6                       INIT. CHAR POINTER
001B      6D56            STD1  TRR,5,6
001C      E850                  ADI,5        #2041          CHANGE TO ALPHABETIC CHAN. DESIG.
001D  A   2041
001E      E650                  STM,5        LINE2+2         AND STORE AWAY.
001F  R   016B
0020      E650                  STM,5        LINE3+2
0021  R   018A
                          * READ RECEIVER DATA....
0022      ED40                  LDI,4        #4340
0023  A   4340
0024      6846                  ADR,4,6
0025      E640                  STM,4        READ1
0026  R   002F
```

```
38      0027      ED40        LDI,4        #4F50
        0028  A   4F50
39      0029      6846        ADR,4,6
40      002A      E640        STM,4        READ2
        002B  R   0030
41      002C      ED40        LDI,4        #4000
        002D  A   4000
42      002E      6846        ADR,4,6
43      002F      4340  READ1 OCD,4,0                    READ STATUS WORD
44      0030      4F50  READ2 IDD,5,0
45      0031      7D55        TRRB,5,5     $+4
        0032  R   0035
46      0033      E700        BRU          OPEN          OPEN INPUT LINE
        0034  R   00EF
47      0035      EC50        XOI,5        #FFFC
        0036  A   FFFC
48      0037      E656        STM,5,6      M.STA         SAVE IT FOR CUR. VALUE
        0038  X   000E
49      0039      6C44        ZRR,4
50      003A      2C42        LLD,4,2
51      003B      2D44        LLS,4,4
52      003C      2C44        LLD,4,4
53      003D      ED30        LDI,3        #3939
        003E  A   3939
54      003F      6934        SUR,3,4
55      0040      6234        ZBR,3,4
56      0041      6235        ZBR,3,5
57      0042      E630        STM,3        LINE2+4       FREQ, PART 1
        0043  R   016D
58      0044      6D16        TRR,1,6
59      0045      2D11        LLS,1,1
60      0046      E631        STM,3,1      U.FRQ
        0047  X   000F
61      0048      6C44        ZRR,4
62      0049      2C44        LLD,4,4
63      004A      ED30        LDI,3        #2E39
        004B  A   2E39
64      004C      6934        SUR,3,4
65      004D      E630        STM,3        LINE2+5       FREQ, PART 2
        004E  R   016E
66      004F      601F        ABR,1,15
67      0050      E631        STM,3,1      U.FRQ
        0051  X   000F
68      0052      6C44        ZRR,4
69      0053      2C43        LLD,4,3
70      0054      E840        ADI,4        #2030
        0055  A   2030
71      0056      E640        STM,4        LINE2+6       CARDIOID SETTING
        0057  R   016F
72      0058      6C44        ZRR,4
```

```
 73     0059      2C41        LLD,4,1
 74     005A      6D14        TRR,1,4                          COPY INE BIT
 75     005B      E840        ADI,4          #2030
        005C  A   2030
 76     005D      E640        STM,4          LINE2+7           INE BIT
        005E  R   0170
 77     005F      6C44        ZRR,4
 78     0060      2C41        LLD,4,1
 79     0061      6B14        ORR,1,4                          OR IN MAINT. BIT
 80     0062      E840        ADI,4          #2030
        0063  A   2030
 81     0064      E640        STM,4          LINE2+8           MAINT BIT
        0065  R   0171
 82     0066      ED40        LDI,4          #4D20             AUTO/MAN. = M
        0067  A   4D20
 83     0068      7650        TBRB,5,0       $+4
        0069  R   006C
 84     006A      ED40        LDI,4          #4120             AUTO/MAN. = A
        006B  A   4120
 85     006C      E640        STM,4          LINE2+10
        006D  R   0173
 86                         * SO MUCH FOR THE INFO FROM THE RECEIVER.
 87                         *   CHECK, IF EITHER MAINT OR INE IS SET,
 88                         *   TERMINATE LINE HERE.
 89                         * OTHERWISE, LINE UP PROCESSOR CONTROLLED PARAMETERS.
 90     006E      761F        TBRB,1,15      SHORT
        006F  R   00E5
 91     0070      6C44        ZRR,4
 92     0071      E556        LDM,5,6        U.GAN             DO GAIN
        0072  X   0008
 93     0073      ED10        LDI,1          10
        0074  A   000A
 94     0075      2141        DVR,4,1
 95     0076      E850        ADI,5          #2030
        0077  A   2030
 96     0078      E650        STM,5          LINE2+11
        0079  R   0174
 97     007A      0944        MBL,4,4
 98     007B      E840        ADI,4          #3020
        007C  A   3020
 99     007D      E640        STM,4          LINE2+12
        007E  R   0175
100     007F      E556        LDM,5,6        U.TRK             DO TRACK RATE
        0080  X   0009
101     0081      0955        MBL,5,5
102     0082      E850        ADI,5          #3020
        0083  A   3020
103     0084      E650        STM,5          LINE2+14
        0085  R   0177
104     0086      6C44        ZRR,4                            DO BLANKING LEVEL
```

```
0087      E556      LDM,5,6      U.BLL
0088  X   000A
0089      2141      DVR,4,1
008A      E850      ADI,5        #2030
008B  A   2030
008C      E650      STM,5        LINE2+15
008D  R   0178
008E      0944      MBL,4,4
008F      E840      ADI,4        #3020
0090  A   3020
0091      E640      STM,4        LINE2+16
0092  R   0179
                  * NOW SET UP CURRENT VALUE FOR THE DIURNAL,
                  *   STANDART DEVIATION, AND AMPLITUDE.
0093      E556      LDM,5,6      U.DIU          DIURNAL
0094  X   000C
0095      2041      MPR,4,1                      *10
0096      2A46      RAD,4,6
0097      605F      ABR,5,15
0098      2851      RAS,5,1
0099      6DC5      TRR,12,5
009A      E7E0      BLM,14       E:BAD          CONVERT TO ASCII DECIMAL
009B  X   0004
009C      E540      LDM,4        E.BSG
009D  X   0005
009E      E640      STM,4        LINE2+17       STORE SIGN
009F  R   017A
00A0      ED20      LDI,2        E.BDF
00A1  X   0006
00A2      FD42      LDX,4,2
00A3      0944      MBL,4,4
00A4      E840      ADI,4        #20
00A5  A   0020
00A6      E640      STM,4        LINE2+20
00A7  R   017D
00A8      602F      ABR,2,15
00A9      FD42      LDX,4,2
00AA      0944      MBL,4,4
00AB      E840      ADI,4        #2E
00AC  A   002E
00AD      E640      STM,4        LINE2+19
00AE  R   017C
00AF      602F      ABR,2,15
00B0      FD42      LDX,4,2
00B1      602F      ABR,2,15
00B2      FD52      LDX,5,2
00B3      0955      MBL,5,5
00B4      6B54      ORR,5,4
00B5      E650      STM,5        LINE2+18
00B6  R   017B
```

```
140     00B7      E5C6        LDM,12,6     U.SIG          GET SIGMA
        00B8  X   000B
141     00B9      E7F0        BLM,15       E:FMF
        00BA  X   0007
142     00BB  R   0196        DFC          TEMP           CONVERT FOR OUTPUT
143     00BC      E530        LDM,3        TEMP+2
        00BD  R   0198
144     00BE      E630        STM,3        LINE2+21
        00BF  R   017E
145     00C0      E530        LDM,3        TEMP+3
        00C1  R   0199
146     00C2      E630        STM,3        LINE2+22
        00C3  R   017F
147     00C4      E530        LDM,3        TEMP+4
        00C5  R   019A
148     00C6      E630        STM,3        LINE2+23
        00C7  R   0180
149     00C8      E7E0        BLM,14       E:FAM
        00C9  R   00FD
150     00CA  R   0181        DFC          LINE2+24
151                     * ALSO, SHOW THE CHANNEL STATUS FROM U.CST
152     00CB      E546        LDM,4,6      U.CST
        00CC  X   0012
153     00CD      614F        SBR,4,15
154     00CE      2D41        LLS,4,1
155     00CF      E534        LDM,3,4      STAT
        00D0  R   019B
156     00D1      E630        STM,3        L2S1+1
        00D2  R   0185
157     00D3      604F        ABR,4,15
158     00D4      E534        LDM,3,4      STAT
        00D5  R   019B
159     00D6      E630        STM,3        L2S1+2
        00D7  R   0186
160     00D8      E7E0  STD2  BLM,14       E:028          OUTPUT LINE.
        00D9  X   0002
161     00DA  R   0169        DFC          LINE2
162     00DB      606F  STD3  ABR,6,15
163     00DC      ED50        LDI,5        14
        00DD  A   000E
164     00DE      7956        SURB,5,6     STD1           LOOP THRU 14 CHANNELS
        00DF  R   001B
165     00E0      E7E0        BLM,14       E:028
        00E1  X   0002
166     00E2  R   0193        DFC          TERMN          TERMINATION MSG.
167     00E3      E700        BRU          E:SKD          RETURN
        00E4  X   0011
168     00E5      6C22  SHORT ZRR,2
169     00E6      E620        STM,2        LINE2+11
        00E7  R   0174
```

```
170     00E8      8206        OBMM,0,6     U.IHB        SET INHIBIT BIT
        00E9  X   0010
171     00EA      652D        LBR,2,13
172     00EB      E626        STM,2,6      U.CST        SET CHAN DOWN
        00EC  X   0012
173     00ED      E700        BRU          STD2
        00EE  R   00D8
174     00EF      8206  OPEN  OBMM,0,6     U.IHB        SET INHIBIT BIT
        00F0  X   0010
175     00F1      652D        LBR,2,13
176     00F2      E626        STM,2,6      U.CST        SET CHAN DOWN
        00F3  X   0012
177     00F4      EC50        XOI,5        #FFFC
        00F5  A   FFFC
178     00F6      E656        STM,5,6      M.STA
        00F7  X   000E
179     00F8      E7E0        BLM,14       E:028
        00F9  X   0002
180     00FA  R   0188        DFC          LINE3        LOG |ZERO INPUT|
181     00FB      E700        BRU          STD3
        00FC  R   00DB
```

```
                    ******************************************************************
                    * E:FAM WILL TAKE THE AMPLITUDE OF THE CHANNEL
                    *   SPECIFIED IN R6, CONVERTS IT FOR OUTPUT AND
                    *   STORES THE RESULT IN THREE WORDS STARTING AT
                    *   THE LOC SPECIFIED BY THE PARAMETER IN THE CALLING
                    *   SEQUENCE:
                    *     BLM,14        E:FAM    CHAN IN R6
                    *   (LOC OF FIRST WCRD OF OUTPUT)
                    * FORMAT:  |+00.00|  ( IN DB )
00FD      A510      E:FAM SFM,1         FAMSV
00FE  R   012C
00FF      FD7E          LDX,7,14                      GET STORE ADDR.
0100      60EF          ABR,14,15                     MOVE RET ADDR.
0101      E6E0          STM,14        FSV14
0102  R   012A
0103      607E          ABR,7,14
0104      E556          LDM,5,6       U.AMP
0105  X   000D
0106      ED10          LDI,1         1000
0107  A   03E8
0108      2041          MPR,4,1                       AMP*1000
0109      2A4B          RAD,4,11                       /2048
010A      E950          SUI,5         500
010B  A   01F4
010C      2F52          LAS,5,2
010D      6DC5          TRR,12,5
010E      E7E0          BLM,14        E:BAD           CONVERT TO DECIMAL
010F  X   0004
0110      ED20          LDI,2         E.BDF
0111  X   0006
0112      FD42          LDX,4,2
0113      602F          ABR,2,15
0114      FD52          LDX,5,2
0115      0955          MBL,5,5
0116      6B54          ORR,5,4
0117      FE57          STX,5,7                        |....00|
0118      617F          SBR,7,15
0119      602F          ABR,2,15
011A      FD42          LDX,4,2
011B      0944          MBL,4,4
011C      E840          ADI,4         #002E            |..0.00|
011D  A   002E
011E      FE47          STX,4,7
011F      617F          SBR,7,15
0120      602F          ABR,2,15
0121      FD52          LDX,5,2
0122      E540          LDM,4         E.BSG            GET SIGN
0123  X   0005
0124      0944          MBL,4,4
0125      6854          ADR,5,4
```

```
 224    0126      FE57        STX,5,7                      |+00.00|
 225    0127      A410        LFM,1        FAMSV           RESTORE REGISTERS
        0128  R   012C
 226    0129      EDE0        LDI,14       0
        012A  A   0000
 227          R   012A  FSV14 EQU          $-1
 228    012B      FF0E        BRX,14                        RETURN
 229    012C  A   0000  FAMSV RES          7,0
```

```
231                     ************************************************************
232     0133  A  0D0A   LINE0 DFC          #0D0A
233     0134  A  0A0A   LINE1 DFC          #0A0A,|123 123456  CURRENT |
        0135  A  3132
        0136  A  3320
        0137  A  3132
        0138  A  3334
        0139  A  3536
        013A  A  2020
        013B  A  4355
        013C  A  5252
        013D  A  454E
        013E  A  5420
234     013F  A  5245         DFC          |RECEIVER STATUS, DET 515|
        0140  A  4345
        0141  A  4956
        0142  A  4552
        0143  A  2053
        0144  A  5441
        0145  A  5455
        0146  A  532C
        0147  A  2044
        0148  A  4554
        0149  A  2035
        014A  A  3135
235     014B  A  0D0A         DFC          #0D0A,#0A20
        014C  A  0A20
236     014D  A  4348         DFC          |CHAN FREQ C  I  M AM GAIN TR BLL|
        014E  A  414E
        014F  A  2046
        0150  A  5245
        0151  A  5120
        0152  A  4320
        0153  A  4920
        0154  A  4D20
        0155  A  414D
        0156  A  2047
        0157  A  4149
        0158  A  4E20
        0159  A  5452
        015A  A  2042
        015B  A  4C4C
237     015C  A  2044         DFC          | DIURNAL SIGMA AMPLITUDE|,0
        015D  A  4955
        015E  A  524E
        015F  A  414C
        0160  A  2053
        0161  A  4947
        0162  A  4D41
        0163  A  2041
```

```
        0164  A  4D50
        0165  A  4C49
        0166  A  5455
        0167  A  4445
        0168  A  0000
238     0169  A  0D0A  LINE2 DFC        #0D0A,|   A  16.0 2 0 0  A  2|
        016A  A  2020
        016B  A  2041
        016C  A  2020
        016D  A  3136
        016E  A  2E30
        016F  A  2032
        0170  A  2030
        0171  A  2030
        0172  A  2020
        0173  A  4120
        0174  A  2032
239     0175  A  3320         DFC        |3   7  06  +000.0 000.6  00.00|
        0176  A  2020
        0177  A  3720
        0178  A  2030
        0179  A  3620
        017A  A  202B
        017B  A  3030
        017C  A  302E
        017D  A  3020
        017E  A  3030
        017F  A  302E
        0180  A  3620
        0181  A  2030
        0182  A  302E
        0183  A  3030
240     0184  A  2020  L2S1  DFC        |  DOWN|
        0185  A  444F
        0186  A  574E
241     0187  A  0000         DFC        #0000
242     0188  A  0D0A  LINE3 DFC        #0D0A,|   A ZERO INPUT...|,0
        0189  A  2020
        018A  A  2041
        018B  A  205A
        018C  A  4552
        018D  A  4F20
        018E  A  494E
        018F  A  5055
        0190  A  542E
        0191  A  2E2E
        0192  A  0000
243     0193  A  0D0A  TERMN DFC        #0D0A,#0A0A,#0000
        0194  A  0A0A
        0195  A  0000
```

```
 244     0196  A  0000  TEMP  RES          5,0
 245     019B  A  2055  STAT  DFC          | UP C,NRC,R DOWN|
         019C  A  5020
         019D  A  432C
         019E  A  4E52
         019F  A  432C
         01A0  A  5220
         01A1  A  444F
         01A2  A  574E
 246     01A3                 END

TOTAL ASSEMBLY ERRORS =   0    SIZE =   419
```

```
                          PGM            E$LOG
                           INT            E:LOG,U.FRQ
                           EXT            E:028,E:FRT,E:BAD,U.TRK,U.GAN
                           EXT            E.BDF,U.BLL,E.28F
                       * THIS IS THE LOG MESSAGE GENERATOR.  CHANGES IN SYSTEM STATUS OR
                       *   PARAMETER VALUES ARE LOGGED ON THE STATION LOGGING TELEPRINTER.
                       *   THE OUTPUT FORMAT IS.....
                       *   CHAR 1-3....DAY OF YEAR
                       *   CHAR 4......BLANK
                       *   CHAR 5-10...ZULU TIME OF DAY
                       *   CHAR 11-12..BLANK
                       *   CHAR 13.....CHANNEL DESIGNATOR
                       *   CHAR 14.....BLANK
                       *   CHAR 15-16..TWO CHAR CODED MESSAGE (SEE MESSAGE TABLE)
                       *   NEW VALUE, ETC. FOLLOWS FOR APPROPRIATE MESSAGES.
                       * THE CALLING SEQUENCE DEPENDS ON THE TYPE OF MESSAGE.
                       *   FOR ALL MESSAGES, ONE PARAMETER IS PASSED VIA R5, INTERPRETED AS..
                       *      BITS 0-7....CHANNEL DESIGNATOR, 0 FOR CHAN A, 1 FOR B, ETC.
                       *      BITS 8-15...MESSAGE NUMBER POINTS TO ENTRY IN MSG. TABLE
                       *   FOR MESSAGES WITH NO NEW VALUE, ETC. NEEDED...
                       *      BLM,4          E:LOG
                       *   WHILE FOR MESSAGES WITH FURTHER INFORMATION...
                       *      BLM,4          E:LOG
                       *      DFC            (NEW VALUE OR OTHER ADDITIONAL INFORMATION)
     0000      E7E0    E:LOG BLM,14         E:FRT          SET UP DAY/TIME GROUP FOR OUTPUT
     0001  X   0002
     0002  R   00B9        DFC              OBUFF+1
     0003      A510        SFM,1            SAVRS          SAVE REGISTERS
     0004  R   00C9
     0005      0B75        MUR,7,5                         SEPARATE CHAN AND MSG NO.
     0006      E870        ADI,7            #4120          CONVERT CHARS TO ASCII
     0007  A   4120
     0008      E670        STM,7            OBUF1          STORE CHANNEL INDICATOR
     0009  R   00BF
     000A      EA50        ETI,5            #FF00          RECOVER MSG NO.
     000B  A   FF00
     000C      E525        LDM,2,5          MSGTB          GET TWO CHAR. CODED MSG.
     000D  R   00A2
     000E      E620        STM,2            OBUF1+1        STORE MSG IN OUTPUT BUFFER
     000F  R   00C0
     0010      7D55        TRRB,5,5         $+4            IS MSG =0?
     0011  R   0014
     0012      E700        BRU              UPMSG           YES, DO UP MSG.
     0013  R   0063
     0014      715F        SBRB,5,15        $+4            IS MSG =1?
     0015  R   0018
     0016      E700        BRU              FRMSG           YES, DO FC MSF.
     0017  R   0028
     0018      E950        SUI,5            5
     0019  A   0005
```

```
 39     001A      7650        TBRB,5,0      PRMSG          MSG NO IS 2, 3, 4, 5.
        001B  R   004B
 40     001C      6C66        ZRR,6
 41     001D      E660        STM,6         OBUF1+2        STORE MSG TERMINATOR (#00)
        001E  R   00C1
 42     001F      6C22  LOG1  ZRR,2
 43     0020      E620        STM,2         E.28F
        0021  X   0008
 44     0022      E7E0        BLM,14        E:028          LOG MSG ON ASR 28
        0023  X   0001
 45     0024  R   00B8        DFC           OBUFF
 46     0025      A410        LFM,1         SAVRS          RESTORE REGISTERS
        0026  R   00C9
 47     0027      FF04        BRX,4                        RETURN
 48                      * FREQUENCY CHANGE MESSAGE...
 49     0028      E740  FRMSG BLM,4         GETCH          GET CHANNEL IN R5
        0029  R   009A
 50     002A      2D51        LLS,5,1
 51     002B      E578        LDM*,7        SAVRS+3        GET PARAMETERS
        002C  R   00CC
 52     002D      80F0        ABMM,15       SAVRS+3        MOVE RETURN AROUND PARM.
        002E  R   00CC
 53     002F      6C66        ZRR,6
 54     0030      2C62        LLD,6,2                      FREQ*10 INTO R6
 55     0031      2D64        LLS,6,4
 56     0032      2C64        LLD,6,4                      FREQ*1 INTO R6
 57     0033      ED40        LDI,4         #3939
        0034  A   3939
 58     0035      6946        SUR,4,6                      RECOVER FREQ FROM 9'S COMPLIMENT
 59     0036      6245        ZBR,4,5
 60     0037      6244        ZBR,4,4
 61     0038      E645        STM,4,5       U.FRQ          SAVE FOR OTHER USES
        0039  R   00D0
 62     003A      605F        ABR,5,15
 63     003B      E640        STM,4         OBUF1+2        STORE IN OUTPUT BUFFER
        003C  R   00C1
 64     003D      6C66        ZRR,6
 65     003E      2C64        LLD,6,4                      FREQ*1 INTO R6
 66     003F      ED40        LDI,4         #2E39
        0040  A   2E39
 67     0041      6946        SUR,4,6                      RECOVER VALUE FROM 9'S COMPLIMENT
 68     0042      E645        STM,4,5       U.FRQ          SAVE REST OF FREQ.
        0043  R   00D0
 69     0044      E640        STM,4         OBUF1+3        STORE IN OUTPUT BUFFER
        0045  R   00C2
 70     0046      6C66        ZRR,6
 71     0047      E660        STM,6         OBUF1+4        STORE MSG TERMINATOR
        0048  R   00C3
 72     0049      E700        BRU           LOG1           OUTPUT MSG.
        004A  R   001F
```

```
                        * PARAMETER CHANGE MSG....
 0048      E6C0  PRMSG STM,12        HLD12        SAVE R12
 004C  R   0054
 004D      E5C8        LDM*,12       SAVRS+3      GET PARAMETER VALUE
 004E  R   00CC
 004F      80F0        ABMM,15       SAVRS+3      MOVE RETURN AROUND PARM.
 0050  R   00CC
 0051      E7E0        BLM,14        E:BAD        CONVERT VALUE TO ASCII DECIMAL
 0052  X   0003
 0053      EDC0        LDI,12        0
 0054  A   0000
       R   0054  HLD12 EQU           $-1
 0055      ED20        LDI,2         E.BDF
 0056  X   0006
 0057      FD52        LDX,5,2                    GET LOW ORDER DIGIT
 0058      602F        ABR,2,15
 0059      FD42        LDX,4,2                    GET HIGH ORDER DIGIT
 005A      0944        MBL,4,4
 005B      6B45        ORR,4,5                    PACK TO ONE WORD
 005C      E640        STM,4         OBUF1+2      STORE IN OUTPUT BUFFER
 005D  R   00C1
 005E      6C44        ZRR,4
 005F      E640        STM,4         OBUF1+3      STORE MSG TERMINATOR
 0060  R   00C2
 0061      E700        BRU           LOG1         OUTPUT
 0062  R   001F
                       * UP MESSAGE TIME, GIVE FREQ, TRACK RATE, GAIN, BLANKING LEVEL...
 0063      E740  UPMSG BLM,4         GETCH        CHANNEL POINTER IN R5
 0064  R   009A
 0065      6D45        TRR,4,5
 0066      2D41        LLS,4,1                    U.FRQ POINTER IN R4
 0067      E534        LDM,3,4       U.FRQ
 0068  R   00D0
 0069      E630        STM,3         OBUF1+2      STORE UPPER HALF OF FREQ IN BUFFER
 006A  R   00C1
 006B      604F        ABR,4,15
 006C      E534        LDM,3,4       U.FRQ
 006D  R   00D0
 006E      E630        STM,3         OBUF1+3      STORE LOWER HALF OF FREQ IN BUFFER
 006F  R   00C2
 0070      E535        LDM,3,5       U.TRK        GET TRACK RATE
 0071  X   0004
 0072      E830        ADI,3         #2C30        CONV DIGIT TO ASCII AND ADD COMMA
 0073  A   2C30
 0074      E630        STM,3         OBUF1+4
 0075  R   00C3
 0076      E5C5        LDM,12,5      U.GAN
 0077  X   0005
 0078      E7E0        BLM,14        E:BAD        CONVERT GAIN TO DECIMAL ASCII
 0079  X   0003
```

```
104     007A      ED60        LDI,6          E.BDF
        007B  X   0006
105     007C      FD36        LDX,3,6                       GET LOW ORDER DIGIT
106     007D      0933        MBL,3,3
107     007E      E830        ADI,3          #002C          ADD COMMA
        007F  A   002C
108     0080      E630        STM,3          OBUF1+6        STORE LOW PART OF GAIN
        0081  R   00C5
109     0082      606F        ABR,6,15
110     0083      FD36        LDX,3,6                       GET HIGH ORDER DIGIT
111     0084      E830        ADI,3          #2C00          ADD COMMA
        0085  A   2C00
112     0086      E630        STM,3          OBUF1+5        STORE HIGH PART OF GAIN
        0087  R   00C4
113     0088      E5C5        LDM,12,5       U.BLL          GO AFTER BLANKING LEVEL
        0089  X   0007
114     008A      E7E0        BLM,14         E:BAD          CONV BLANK LEVEL TO DECIMAL ASCII
        008B  X   0003
115     008C      ED60        LDI,6          E.BDF
        008D  X   0006
116     008E      FD36        LDX,3,6                       GET LOW ORDER DIGIT
117     008F      606F        ABR,6,15
118     0090      FD26        LDX,2,6                       GET HIGH ORDER DIGIT
119     0091      0922        MBL,2,2
120     0092      6B23        ORR,2,3                       PACK TO ONE WORD
121     0093      E620        STM,2          OBUF1+7        STORE IN OUTPUT BUFFER
        0094  R   00C6
122     0095      6C22        ZRR,2
123     0096      E620        STM,2          OBUF1+8        MESSAGE TERMINATOR
        0097  R   00C7
124     0098      E700        BRU            LOG1           OUTPUT
        0099  R   001F
125     009A      ED60  GETCH LDI,6          OBUF1
        009B  R   00BF
126     009C      ED70        LDI,7          0
        009D  A   0000
127     009E      AE56        LBX,5,6                       GET CHAN.
128     009F      E950        SUI,5          #41
        00A0  A   0041
129     00A1      FF04        BRX,4                         RETURN WITH CHAN. IN R5.
130     00A2  A   5520  MSGTB DFC            |U |           00-CHANNEL UP
131     00A3  A   4643        DFC            |FC|           01-FREQUENCY CHANGED
132     00A4  A   4343        DFC            |CC|           02-CARDIOID CHANGED
133     00A5  A   5443        DFC            |TC|           03-TRACKING RATE CHANGED
134     00A6  A   4743        DFC            |GC|           04-GAIN CHANGED
135     00A7  A   4243        DFC            |BC|           05-BLANKING LEVEL CHANGED
136     00A8  A   5253        DFC            |RS|           06-REDUNDANCY CHECK SUCCESSFUL
137     00A9  A   5344        DFC            |SD|           07-SYSTEM DEAD IN SCHEDULER
138     00AA  A   4D4E        DFC            |MN|           08-MANUAL/AUTO TO MANUAL
139     00AB  A   4155        DFC            |AU|           09-MANUAL/AUTO TO AUTO
```

```
 140     00AC  A  4D53        DFC          |MS|          10-MAINTENANCE SET
 141     00AD  A  4D52        DFC          |MR|          11-MAINTENANCE RESET
 142     00AE  A  4953        DFC          |IS|          12-INE SET
 143     00AF  A  4952        DFC          |IR|          13-INE RESET
 144     00B0  A  4346        DFC          |CF|          14-CHAN COASTING DUE TO LOST SIGNAL
 145     00B1  A  434E        DFC          |CN|          15-CHAN COASTING DUE TO NOISE
 146     00B2  A  4353        DFC          |CS|          16-CHAN COASTING, SATURATED SIGNAL
 147     00B3  A  4420        DFC          |D |          17-CHANNEL DOWN
 148     00B4  A  4146        DFC          |AF|          18-ANALOG SYSTEM FAILURE
 149     00B5  A  5046        DFC          |PF|          19-POWER FAILURE
 150     00B6  A  5052        DFC          |PR|          20-POWER REGAINED
 151     00B7  A  4D50        DFC          |MP|          21-MEMORY PARITY ERROR DISCOVERED
 152     00B8  A  0D0A  OBUFF DFC          #0D0A,|123 123456  |
         00B9  A  3132
         00BA  A  3320
         00BB  A  3132
         00BC  A  3334
         00BD  A  3536
         00BE  A  2020
 153     00BF  A  0000  OBUF1 RES          10,0
 154     00C9           SAVRS RES          7
 155     00D0  A  0000  U.FRQ RES          28,0
 156     00EC                END

TOTAL ASSEMBLY ERRORS =   0    SIZE =   236
```

```
 1                          PGM          E$BDC
 2                           INT          E:BDC,E:BAD,E.BDF,E.BSG
 3                       * THIS UTILITY PROGRAM CONVERTS A BINARY VALUE IN R12 TO ITS ASCII
 4                       *   DECIMAL (E:BAD) OR BCD (E:BDC) EQUIVALENT, LEAVING THOSE CHARS,
 5                       *   LEAST SIGNIFICANT DIGIT FIRST, IN A FIVE WORD BUFFER (E.BDF).
 6                       *   THE ASCII REPRESENTATION OF THE NUMBER'S SIGN IS STORED IN E.BSG.
 7                       * CALLING SEQUENCES ARE.......
 8                       *     BLM,14          E:BDC          FOR BCD CHARS
 9                       *     BLM,14          E:BAD          FOR ASCII CHARS
10                       *      WITH BINARY NUMBER IN R12
11      0000      8200  E:BDC OBMM,0         CONVR          SET CONVERSION FLAG
        0001  R   0026
12      0002      F703        HOP,$+3
13      0003      8100  E:BAD ZBMM,0         CONVR          RESET CONVERSION FLAG
        0004  R   0026
14      0005      A510        SFM,1          SAVRS          SAVE WORKING REGISTERS
        0006  R   0027
15      0007      76C0        TBRB,12,0      NEGNO          IS NUMBER NEGATIVE?
        0008  R   000E
16      0009      ED10        LDI,1          #202B            NO..
        000A  A   202B
17      000B      E610        STM,1          E.BSG          SET E.BSG TO '+'.
        000C  R   002E
18      000D      F706        HOP,$+6
19      000E      ED10  NEGNO LDI,1          #202D            YES..
        000F  A   202D
20      0010      E610        STM,1          E.BSG          SET E.BSG TO '-'.
        0011  R   002E
21      0012      6FCC        TTR,12,12                     GET ABS (NUMBER) FOR NO.
22      0013      ED10        LDI,1          -5
        0014  A   FFFB
23      0015      ED20        LDI,2          10
        0016  A   000A
24      0017      6D5C        TRR,5,12
25      0018      6C44  DIVLP ZRR,4
26      0019      2142        DVR,4,2
27      001A      8600        TBMB,0         CONVR,$+5      CHECK FOR ASCII OR BCD OUTPUT
        001B  R   0026
        001C  R   001F
28      001D      E840        ADI,4          #30              CONV. TO ASCII.
        001E  A   0030
29      001F      E641        STM,4,1        E.BDF+5
        0020  R   0034
30      0021      701F        ABRB,1,15      DIVLP           LOOP BACK TILL FOUR CHARS.
        0022  R   0018
31      0023      A410        LFM,1          SAVRS           RESTORE REGISTERS
        0024  R   0027
32      0025      FF0E        BRX,14                         RETURN
33      0026  A   0000  CONVR DFC            0               CODE I.D. FLAG
34      0027            SAVRS RES            7
```

```
 35     002E  A  0000  E.BSG DFC          0          NUMBER SIGN
 36     002F            E.BDF RES          5          WORKING AND OUTPUT BUFFER
 37     0034                  END

TOTAL ASSEMBLY ERRORS =   0    SIZE =    52
```

```
 1                          PGM          E$FRT
 2                           INT          E:FRT,E:FCT,E.TM1,E.TM2
 3                     *     CAT NO.  400000-007
 4                     * THIS ROUTINE PREPARES THE DOY/TIME GROUP AND STORES THE ASCII
 5                     *   REPRESENTATION IN MEMORY STARTING AT THE LOCATION SPECIFIED
 6                     *   IN THE PARAMETER.  IF ENTRY IS MADE AT E:FRT, THE CURRENT TIME
 7                     *   IS READ FROM THE WORLD TIME CLOCK AND IS USED.  IF ENTRY IS MADE
 8                     *   AT E:FCT, THE DAY/TIME GROUP IN E.TM1,E.TM2 IS USED.  THE CALLING
 9                     *   SEQUENCE FOR EACH FOLLOWS.
10                     *     BLM,14       E:FRT
11                     *     DFC          (ADDR. TO STORE ASCII CHARS. IN)
12                     *     BLM,14       E:FCT          (TIME IS IN E.TM1,E.TM2)
13                     *     DFC          (ADDR. TO STORE ASCII CHARS. IN)
14     0000     A5A0  E:FCT SFM,10       SAVER          USE R10 - R15
       0001  R  0041
15     0002     E700        BRU          FMTIM
       0003  R  0011
16     0004     A5A0  E:FRT SFM,10       SAVER          USE R10 - R15
       0005  R  0041
17     0006     EDB0        LDI,11       #4000          SET UP TO READ DOY/TIME GROUP OFF WTC
       0007  A  4000
18     0008     43BF        OCD,11,#F
19     0009     4FDF        IDD,13,#F
20     000A     0DDD        TOR,13,13
21     000B     E6D0        STM,13       E.TM1
       000C  R  0047
22     000D     4FDF        IDD,13,#F
23     000E     0DDD        TOR,13,13
24     000F     E6D0        STM,13       E.TM2
       0010  R  0048
25     0011     FDAE  FMTIM LDX,10,14                   GET PARAMETER, I.E. STORAGE LOCATION~
26     0012     80F0        ABMM,15      SAVER+4        UPDATE RETURN ADDRESS
       0013  R  0045
27     0014     6CCC        ZRR,12
28     0015     E5D0        LDM,13       E.TM1          HI INPUT WORD
       0016  R  0047
29     0017     2CC2        LLD,12,2                    DAY X 100 INTO R12
30     0018     2DC4        LLS,12,4
31     0019     2CC4        LLD,12,4                    GET DAY TIMES 10
32     001A     E8C0        ADI,12       #3030          CONVERT DIGITS TO ASCII
       001B  A  3030
33     001C     FECA        STX,12,10                   STORE AWAY
34     001D     60AF        ABR,10,15                   MOVE OUTPUT WORD POINTER
35     001E     6CCC        ZRR,12
36     001F     2CC4        LLD,12,4                    GET DAY X 1
37     0020     09CC        MBL,12,12
38     0021     E8C0        ADI,12       #3020          CONV TO ASCII AND ADD SPACE CHAR
       0022  A  3020
39     0023     FECA        STX,12,10                   STORE AWAY
40     0024     60AF        ABR,10,15                   MOVE POINTER TO NEXT WORD
```

```
 41     0025      6CCC        ZRR,12
 42     0026      2CC2        LLD,12,2                    GET HR X 10
 43     0027      2DC4        LLS,12,4
 44     0028      2CC4        LLD,12,4                    GET HR X 1
 45     0029      E8C0        ADI,12        #3030         CONVERT TO ASCII
        002A  A   3030
 46     002B      FECA        STX,12,10                   STORE AWAY
 47     002C      60AF        ABR,10,15                   MOVE POINTER TO NEXT LOCATION
 48     002D      E5D0        LDM,13        E.TM2         GET LO INPUT WORD
        002E  R   0048
 49     002F      6CCC        ZRR,12
 50     0030      2CC5        LLD,12,5                    GET MIN X 10
 51     0031      2DC4        LLS,12,4
 52     0032      2CC4        LLD,12,4                    GET MIN X 1
 53     0033      E8C0        ADI,12        #3030         CONVERT TO ASCII
        0034  A   3030
 54     0035      FECA        STX,12,10                   STORE AWAY
 55     0036      60AF        ABR,10,15                   MOVE POINTER TO NEXT LOCATION
 56     0037      6CCC        ZRR,12
 57     0038      2CC3        LLD,12,3                    GET SEC X 10
 58     0039      2DC4        LLS,12,4
 59     003A      2CC4        LLD,12,4                    GET SEC X 1
 60     003B      E8C0        ADI,12        #3030         CONVERT TO ASCII
        003C  A   3030
 61     003D      FECA        STX,12,10                   STORE AWAY
 62     003E      A4A0        LFM,10        SAVER         RESTORE REGISTERS
        003F  R   0041
 63     0040      FF0E        BRX,14                      RETURN
 64     0041            SAVER RES           6             REGISTER SAVER
 65     0047  A   0000  E.TM1 DFC           0             DAY/TIME GROUP IN INPUT FORMAT
 66     0048  A   0000  E.TM2 DFC           0              CON'T
 67     0049                  END

TOTAL ASSEMBLY ERRORS =   0    SIZE =    73
```

```
                          PGM          E$DIF
                           INT          E:DIF,E:COT
                           EXT          U.OTM
                      *    CAT NO.  400000-012
                      * E$DIF CONTAINS TWO EXECUTIVE UTILITY PROGRAMS CONCERNED WITH THE
                      *   CONVERSION OF BCD TIME, AS READ THRU THE IOIS, TO BINARY COUNT OF
                      *   SECONDS.
                      * E:COT SIMPLY CONVERTS THE BCD TIME CHARACTERS AT THE LOCATION
                      *   SPECIFIED IN THE PARAMETER WORD TO BINARY, RETURNS IN R12,R13
                      * E:DIF DOES NOTHING IF THERE IS NO SIGNAL IN PROGRESS, I.E. THE CHAN'S~
                      *   ONSET TIME IS ZERO.   IF A SIGNAL IS CURRENTLY IN PROGRESS, THE
                      *   DIFFERENCE BETWEEN THE ONSET TIME AND THE TIME SPECIFIED BY THE
                      *   CALLING PARAMETER IS RETURNED IN R12,R13. CHANNEL DESIGNATED IN R6.~
                      * CALLING SEQUENCE.....
                      *     BLM,14        E:COT
                      *     (ADDRESS OF FIRST WORD OF TIME TO BE CONVERTED)
                      * OR....
                      *     BLM,14        E:DIF
                      *     (ADDRESS OF FIRST WORD OF TIME TO BE CONVERTED)
                      *     (RETURN LOCATION IF ONSET TIME IS ZERO)
                      *     (RETURN LOCATION WITH TIME DIFFERENCE FROM ONSET)
                      * COMPUTATION IS MADE THUSLY:
                      *   IF D0=HR*10
                      *      D1=HR*1
                      *      D2=MIN*10
                      *      D3=MIN*1
                      *      D4=SEC*10
                      *      D5=SEC*1
                      *   THEN
                      *    SECONDS COUNT = (((((D0*10+D1)*6+D2)*6+D4):10+D5)
      0000     A510  E:COT SFM,1         SAVER          SAVE REGISTERS FOR RETURN
      0001  R  0052
      0002     8200       OBMM,0         FLAG           SET ENTRY FLAG FOR E:COT
      0003  R  0059
      0004     E700       BRU            COMCN
      0005  R  0016
      0006     A510  E:DIF SFM,1         SAVER          WEIDER, SAVE THE REGISTERS
      0007  R  0052
      0008     8100       ZBMM,0         FLAG           JA WOHL, UND RESET DAS ENTRY FLAG
      0009  R  0059
      000A     2D61       LLS,6,1                       SET UP FOR CHAN D.P. POINTER
      000B     E516       LDM,1,6        U.OTM
      000C  X  0001
      000D     606F       ABR,6,15
      000E     E016       ADM,1,6        U.OTM          BRU IF U.OTM ISN'T ZERO
      000F  X  0001
      0010     7D11       TRRB,1,1       COMON
      0011  R  0016
      0012     60FF       ABR,14,15                     RETURN IF NO SIGNAL IN PROGRESS
      0013     A410  RETRN LFM,1         SAVER          RESTORE REGISTERS
```

```
        0014  R  0052
43      0015     FF0E          BRX,14                          UND, RETURN
44      0016     FD7E   COMON  LDX,7,14                        GET HI ORDER TIME WORD ADDRESS
45      0017     FD57          LDX,5,7                         NOW GET THE WORD
46      0018     60EF          ABR,14,15                       MOVE RETURN ADDRESS OVER PARAMETER
47      0019     2D5A          LLS,5,10                        MOVE HRX10 TO LEFT END OF R5
48      001A     6C44          ZRR,4
49      001B     2C42          LLD,4,2                         AND OVER INTO R4.
50      001C     6DD4          TRR,13,4                        R13=HRX10
51      001D     ED10          LDI,1          #A               R1=10
        001E  A  000A
52      001F     20C1          MPR,12,1
53      0020     6C44          ZRR,4
54      0021     2C44          LLD,4,4                         MOVE HR X 1 DIGIT TO R4
55      0022     68D4          ADR,13,4                        AND ADD TO R13
56      0023     ED20          LDI,2          #6               R2=6
        0024  A  0006
57      0025     20C2          MPR,12,2                        ?
58      0026     607F          ABR,7,15                        SET UP TO GET LOW ORDER TIME WORD
59      0027     FD57          LDX,5,7                         THEN GET IT
60      0028     6C44          ZRR,4
61      0029     2C45          LLD,4,5                         GET MIN*10
62      002A     68D4          ADR,13,4                        AND ADD TO R13
63      002B     20C1          MPR,12,1
64      002C     6C44          ZRR,4
65      002D     2C44          LLD,4,4                         GET MIN*1
66      002E     68D4          ADR,13,4                        AND ADD TO R13
67      002F     20C2          MPR,12,2
68      0030     6C44          ZRR,4
69      0031     2C43          LLD,4,3                         GET SEC*10
70      0032     68D4          ADR,13,4                        AND ADD TO R13
71      0033     20C1          MPR,12,1
72      0034     6C44          ZRR,4
73      0035     2C44          LLD,4,4                         GET SEC*1
74      0036     6D54          TRR,5,4
75      0037     6C44          ZRR,4
76      0038     22C4          DAR,12,4                        AND DOUBLE PRECISION ADD TO R12,R13
77                      * READY TO EXIT IF ONLY TASK WAS TO CONVERT TO BINARY.
78      0039     8600          TBMB,0         FLAG,RETRN
        003A  R  0059
        003B  R  0013
79      003C     60EE          ABR,14,14                       USE 2ND RETURN
80      003D     E556          LDM,5,6        U.OTM            GET ONSET TIME IN R4,R5
        003E  X  0001
81      003F     616F          SBR,6,15
82      0040     E546          LDM,4,6        U.OTM
        0041  X  0001
83      0042     0D44          TOR,4,4                         AND NEGATE
84      0043     6F55          TTR,5,5                         (NEGATE????)
85      0044     7D55          TRRB,5,5       $+3
```

```
          0045  R  0047
  86      0046     604F        ABR,4,15
  87      0047     22C4        DAR,12,4                        THEN ADD TO PARAMETER TIME
  88                         * WE'VE GOT TO WATCH OUT FOR TIME SPREADS WHICH TRAVERSE MIDNIGHT ZULU
  89                         *   IF THE DIFFERENCE IS NEGATIVE, ADD 86,400 SECONDS TO CORRECT.
  90                         *   NOTE: 86,400=#15180
  91      0048     76C0        TBRB,12,0     $+4               CORRECT IF SIGN BIT IS SET
          0049  R  004C
  92      004A     E700        BRU           RETRN             OTHERWISE RETURN
          004B  R  0013
  93      004C     654F        LBR,4,15
  94      004D     ED50 *      LDI,5         #5180             R4,R5=#15180
          004E  A  5180
  95      004F     22C4        DAR,12,4                        ADD 86,400 TO DIFFERENCE
  96      0050     E700        BRU           RETRN              AND NOW RETURN
          0051  R  0013
  97                         * STCRAGE AREA..............
  98      0052  A  0000  SAVER RES           7,0               REGISTER HOLD
  99      0059  A  0000  FLAG  DFC           0                 ENTRY POINT FLAG
 100      005A                END

TOTAL ASSEMBLY ERRORS =   0    SIZE =    90
```

```
 1                          PGM            E$FMF
 2                           INT            E:FMF
 3                           EXT            E:BAD,E.BSG,E.BDF
 4                     *     CAT NO.  400000-013
 5                     * E$FMF ASSUMES THE VALUE IN R12 IS A PHASE VALUE.  THIS
 6                     *   ROUTINE CONVERTS THE NUMBER TO ASCII DECIMAL AND STORES
 7                     *   THE CHARACTERS AWAY IN THE LOCATION SPECIFIED FOR OUTPUT.
 8                     * CALLING SEQUENCE:
 9                     *     BLM,15         E:FMF    (VALUE IN R12)
10                     *    (ADDR OF FIRST LOC. OUTPUT TO  BE STORED IN)
11                     * OUTPUT FORMAT: | +0037.62 |  (I.E. 5 WORDS)
12      0000     A510  E:FMF SFM,1          SAVER
        0001  R  003C
13      0002     FD7F        LDX,7,15                        GET STORE ADDR (R7)
14      0003     60FF        ABR,15,15                       MOD RETURN ADDR
15      0004     6C33        ZRR,3
16      0005     6D2C        TRR,2,12                        COPY VAL IN R2
17      0006     2A24        RAD,2,4                         INTEGER PART IN R2
18      0007     0833        MBR,3,3
19      0008     2934        RLS,3,4                         FRACTION PART IN R3
20      0009     7620        TBRB,2,0       $+4
        000A  R  000D
21      000B     6D13        TRR,1,3
22      000C     F702        HOP,$+2
23      000D     6F13        TTR,1,3                         FRACTION MUST BE POS.
24      000E     6DC2        TRR,12,2
25      000F     E6E0        STM,14         HLD14
        0010  R  0038
26      0011     E7E0        BLM,14         E:BAD
        0012  X  0001
27      0013     ED30        LDI,3          E.BDF
        0014  X  0003
28      0015     E830        ADI,3          3
        0016  A  0003
29      0017     E540        LDM,4          E.BSG
        0018  X  0002
30      0019     FE47        STX,4,7                         STORE SIGN
31      001A     607F        ABR,7,15                        NEXT STORE LOC
32      001B     ED60        LDI,6          -2
        001C  A  FFFE
33      001D     FD43  FMF1  LDX,4,3                         HIGH-ORDERED DIGIT
34      001E     0944        MBL,4,4
35      001F     613F        SBR,3,15
36      0020     F843        ADX,4,3                         NEXT DIGIT
37      0021     FE47        STX,4,7                         STORE FIRST TWO DIGITS
38      0022     607F        ABR,7,15                        NEXT STORE LOC
39      0023     613F        SBR,3,15
40      0024     706F        ABRB,6,15      FMF1
        0025  R  001D
41      0026     ED60        LDI,6          625
```

```
          0027  A  0271
  42      0028     2016        MPR,1,6                        DECIMAL*625
  43      0029     6DC1        TRR,12,1
  44      002A     E7E0        BLM,14          E:BAD
          002B  X  0001
  45      002C     603D        ABR,3,13
  46      002D     FD43        LDX,4,3
  47      002E     E840        ADI,4           #2E00
          002F  A  2E00
  48      0030     FE47        STX,4,7                        STORE |.D|
  49      0031     607F        ABR,7,15
  50      0032     613F        SBR,3,15
  51      0033     FD43        LDX,4,3
  52      0034     0944        MBL,4,4
  53      0035     604A        ABR,4,10
  54      0036     FE47        STX,4,7                        STORE LAST DIGIT, SPACE
  55      0037     EDE0        LDI,14          #0
          0038  A  0000
  56            R  0038  HLD14 EQU            $-1
  57      0039     A410        LFM,1           SAVER
          003A  R  003C
  58      003B     FF0F        BRX,15
  59                         ***************************************************************
  60      003C  A  0000  SAVER RES            7,0
  61      0043                END

TOTAL ASSEMBLY ERRORS =   0    SIZE =    67
```

```
                          PGM          E$SRT
                           INT          E:SRT
                     *     CAT NO.  400000-016
                     * E$SRT IS A SQUARE ROOT COMPUTATION ROUTINE.
                     *   THE CALCULATION USES NEWTON'S METHOD OF
                     *   TANGENTS.
                     * ITERATION IS MADE AS FOLLOWS:
                     *   X(N+1) = ( A/X(N) + X(N) ) / 2
                     * WHERE X(0) IS BASED ON THE VALUE OF A, THE
                     *   ARGUMENT OF THE SQUARE ROOT FUNCTION.
                     * THE ROUTINE IS ENTERED WITH DOUBLE PRECISION
                     *   A IN R12,R13.
                     * THE CALLING SEQUENCE IS:
                     *     BLM,14       E:SRT
                     * AND THE FUNCTION ROOT IS RETURNED IN R13.
0000      A510  E:SRT SFM,1        SAVER
0001  R   0038
0002      6D6C        TRR,6,12                      COPY ARG.
0003      6D7D        TRR,7,13
0004      76C0        TBRB,12,0    NEGAR            IS A<0? BRU IF YES
0005  R   000A
0006      7DCC        TRRB,12,12   SRT1             CHECK A=0
0007  R   000E
0008      7DDD        TRRB,13,13   SRT2
0009  R   0016
000A      6CDD  NEGAR ZRR,13                        RETURN VAL=0
000B      A410  RETRN LFM,1        SAVER            RESTORE REGS.
000C  R   0038
000D      FF0E        BRX,14                        RETURN
000E      ED10  SRT1  LDI,1        31               BIT COUNTER
000F  A   001F
0010      2C61  SRT3  LLD,6,1
0011      7660  SRT4  TBRB,6,0     EXIT
0012  R   001B
0013      611F        SBR,1,15
0014      E700        BRU          SRT3
0015  R   0010
0016      ED10  SRT2  LDI,1        16
0017  A   0010
0018      6D67        TRR,6,7
0019      E700        BRU          SRT4
001A  R   0011
001B      2B11  EXIT  RAS,1,1                       DIVIDE COUNT BY 2
001C      E810        ADI,1        #2A60            MAKE 'RAD,6,N' INSTR
001D  A   2A60
001E      E610        STM,1        SRT6
001F  R   0022
0020      6D6C        TRR,6,12
0021      6D7D        TRR,7,13
0022      2A60  SRT6  RAD,6,0                       COMPUTE X(0)
```

```
 39     0023     6D17        TRR,1,7
 40     0024     6D6C  SRT5  TRR,6,12
 41     0025     6D7D        TRR,7,13
 42     0026     2161        DVR,6,1                      R7=A/X(N)
 43     0027     6871        ADR,7,1                        =A/X(N)+X(N)
 44     0028     2971        RLS,7,1                        =(A/X(N)+X(N))/2
 45                       * NEW ESTIMATE IN R7, CHECK AGAINST OLD ESTIMATE
 46     0029     6917        SUR,1,7
 47     002A     7610        TBRB,1,0     $+3             ABS(X(N+1)-X(N))
        002B  R  002D
 48     002C     F702        HOP,$+2
 49     002D     6F11        TTR,1,1
 50     002E     E910        SUI,1        3               ACCURACY DETERMINATION
        002F  A  0003
 51     0030     7610        TBRB,1,0     $+5
        0031  R  0035
 52     0032     6D17        TRR,1,7                      SET NEW ESTIMATE
 53     0033     E700        BRU          SRT5            AND TRY AGAIN
        0034  R  0024
 54     0035     6DD7        TRR,13,7                     DONE
 55     0036     E700        BRU          RETRN
        0037  R  000B
 56                       ***********************************************************************
 57     0038  A  0000  SAVER RES          7,0             SAVE REGISTERS
 58     003F                END

TOTAL ASSEMBLY ERRORS =   0    SIZE =    63
```

```
                                PGM          F$FMT
                                INT          F:FMT,F:CHK,F:TRD,F:USE,F:CVT
                                INT          F.DBF,F.MTP
 M                              EXT          E:SKD,B.STT,B:IOR,E.35I,F:DDD
 M                              EXT          E:SKD,B.STT,B:IOR,E.35I,F:DDD
                          * THIS PROGRAM GIVES THE OPERATOR THE OPERTUNITY TO CHECK
                          *   THE DR FUD TAPE FORMAT.  IF THE FORMAT PASSES, HE CAN
                          *   BE REASONABLY SURE THAT THE DATA IS VALID.
     0000      7601   F:FMT TBRB,0,1     $+3
     0001  R   0003
     0002      F705         HOP,$+5
     0003      ED40         LDI,4        #3700
     0004  A   3700
     0005      E640         STM,4        F.MTP
     0006  R   0119
     0007      E7F0         BLM,15       B:IOR          REQUEST NO. OF BLOCKS
   M 0008  X   0008
     0009  A   5000         DFC          #5000
     000A  R   00D5         DFC          NUMBK          CANNED REQUEST
                          * RE-ENTRY POINT
     000B      E740         BLM,4        F:CVT
     000C  R   008D
     000D      6F1B         TTR,1,11
     000E      7D11         TRRB,1,1     CIR
     000F  R   0012
     0010      E700         BRU          FINI
     0011  R   0084
     0012      E740   CIR   BLM,4        F:USE
     0013  R   011A
     0014      E740         BLM,4        F:CHK          GO CHECK FORMAT
     0015  R   001C
     0016      6600         NOP
     0017      6600         NOP
     0018      701F         ABRB,1,15    CIR            INCRIMENT BLOCK COUNTER
     0019  R   0012
     001A      E700         BRU          FINI           FINISHED
     001B  R   0084
     001C      ED20   F:CHK LDI,2        C
     001D  A   0000
     001E      ED30         LDI,3        #FCF0          FORMAT CHECKER CODE
     001F  A   FCF0
     0020      ED60         LDI,6        #F8F0          DITTO
     0021  A   F8F0
     0022      E552         LDM,5,2      FUDBF          LOAD FIRST WORD FROM FUDBF
     0023  R   0141
     0024      7E53         TERB,5,3     F.BAD          COMPARE DATA WITH FORMAT CHECK
     0025  R   0052
     0026      602F         ABR,2,15                    IF GOOD GO TO NEXT WORD
     0027      E552         LDM,5,2      FUDBF
     0028  R   0141
```

```
34    0029      7E56          TERB,5,6      F.BAD+3       COMPARE SECOND WORD
      002A  R   0055
35    002B      602F          ABR,2,15                    IF GOOD GO ON
36    002C      E552          LDM,5,2       FUDBF
      002D  R   0141
37    002E      7E56          TERB,5,6      F.BAD+3       COMPARE THIRD WORD
      002F  R   0055
38    0030      602F          ABR,2,15                    IF GOOD GO ON
39    0031      E552          LDM,5,2       FUDBF
      0032  R   0141
40    0033      7E53          TERB,5,3      F.BAD         COMPARE FOURTH WORD
      0034  R   0052
41    0035      ED30          LDI,3         #F0F0         FORMAT CHECKER FOR LOOP
      0036  A   F0F0
42    0037      ED60          LDI,6         -22           COUNTER FOR LOOP
      0038  A   FFEA
43    0039      602F   FLOOP  ABR,2,15
44    003A      E552          LDM,5,2       FUDBF
      003B  R   0141
45    003C      7E53          TERB,5,3      F.BAD+6       COMPARE
      003D  R   0058
46    003E      706F          ABRB,6,15     FLOOP         INC COUNTER
      003F  R   0039
47    0040      602F          ABR,2,15                    OUT OF LOOP, GET NEXT WORD
48    0041      ED60          LDI,6         #3132
      0042  A   3132
49    0043      E552          LDM,5,2       FUDBF
      0044  R   0141
50    0045      6C56          XOR,5,6
51    0046      7D55          TRRB,5,5      F.BAD+8
      0047  R   005A
52    0048      ED60          LDI,6         #3400
      0049  A   3400
53    004A      602F          ABR,2,15
54    004B      E552          LDM,5,2       FUDBF
      004C  R   0141
55    004D      6C56          XOR,5,6
56    004E      7D55          TRRB,5,5      F.BAD+8
      004F  R   005A
57    0050      604E          ABR,4,14                    NORMAL RETURN
58    0051      FF04          BRX,4
59    0052      FA50   F.BAD  ETI,5         #030F
      0053  A   030F
60    0054      F706          HOP,$+6
61    0055      EA50          ETI,5         #070F
      0056  A   070F
62    0057      F703          HOP,$+3
63    0058      EA50          ETI,5         #0F0F
      0059  A   0F0F
64    005A      0865          MBR,6,5                     MOVE LEFT BYTE
```

```
65      005B      7D66        TRRB,6,6      $+3
        005C  R   005E
66      005D      F70A        HOP,CKRTB
67      005E      6C33        ZRR,3                          BIT COUNTER
68      005F      2961        RLS,6,1                        SHIFT BIT OUT
69      0060      7D66        TRRB,6,6      $+4              IS BIT STILL SET
        0061  R   0064
70      0062      E700        BRU           FNDBT            NO THAN YOU HAVE FOUND IT
        0063  R   0070
71      0064      603F        ABR,3,15
72      0065      E700        BRU           $-6
        0066  R   005F
73      0067      6C33  CKRTB ZRR,3
74      0068      2951        RLS,5,1                        SHIFT BIT OUT
75      0069      7D55        TRRB,5,5      $+4
        006A  R   006D
76      006B      E700        BRU           FNDBT
        006C  R   0070
77      006D      603F        ABR,3,15
78      006E      E700        BRU           $-6
        006F  R   0068
79      0070      E553  FNDBT LDM,5,3       TAB
        0071  R   010A
80      0072      E650        STM,5         X.VAL+9
        0073  R   00EE
81      0074      E7F0        BLM,15        B:IOR
    M   0075  X   0008
82      0076  A   9000        DFC           #9000
83      0077  R   00E5        DFC           X.VAL
84      0078      E7E0        BLM,14        F:DDD
    M   0079  X   000A
85      007A      7600        TBRB,0,0      $+4
        007B  R   007E
86      007C      E700        BRU           ABORT
        007D  R   007F
87      007E      FF04        BRX,4                          ERROR RETURN
88      007F      E7F0  ABORT BLM,15        B:IOR
    M   0080  X   0008
89      0081  A   9000        DFC           #9000
90      0082  R   00FB        DFC           QUIT
91      0083      F705        HOP,$+5
92      0084      E7F0  FINI  BLM,15        B:IOR
    M   0085  X   0008
93      0086  A   9000        DFC           #9000
94      0087  R   00F1        DFC           FINSH
95      0088      6C55        ZRR,5
96      0089      E650        STM,5         B.STT
    M   008A  X   0007
97      008B      E700        BRU           E:SKD
    M   008C  X   0006
```

```
 98     008D      6C33  F:CVT ZRR,3
 99     008E      EDC0        LDI,12        10
        008F  A   000A
100     0090      E5B3        LDM,11,3      E.35I
    M   0091  X   0009
101     0092      7DBB        TRRB,11,11    $+4            LAST DIGIT, FALL THRU
        0093  R   0096
102     0094      E700        BRU           CONV1-4
        0095  R   00A1
103     0096      6DFB        TRR,15,11
104     0097      E9F0        SUI,15        #30
        0098  A   0030
105     0099      76F0        TBRB,15,0     CTMSG
        009A  R   00BC
106     009B      E9F0        SUI,15        10
        009C  A   000A
107     009D      76F0        TBRB,15,0     CONV1-2
        009E  R   00A3
108     009F      E700        BRU           CTMSG
        00A0  R   00BC
109     00A1      6CBB        ZRR,11                        AND RETURN
110     00A2      FF04        BRX,4
111     00A3      E9B0        SUI,11        #30
        00A4  A   0030
112     00A5      603F  CONV1 ABR,3,15                      POINT TO NEXT DIGIT
113     00A6      E5E3        LDM,14,3      E.35I           GET NEXT DIGIT
    M   00A7  X   0009
114     00A8      7DEE        TRRB,14,14    $+3
        00A9  R   00AB
115     00AA      FF04        BRX,4
116     00AB      6DFE        TRR,15,14
117     00AC      E9F0        SUI,15        #30
        00AD  A   0030
118     00AE      76F0        TBRB,15,0     CTMSG
        00AF  R   00BC
119     00B0      E9F0        SUI,15        10
        00B1  A   000A
120     00B2      76F0        TBRB,15,0     GOOD
        00B3  R   00B6
121     00B4      E700        BRU           CTMSG
        00B5  R   00BC
122     00B6      20AC  GOOD  MPR,10,12
123     00B7      E9E0        SUI,14        #30             CONVERT NEXT DIGIT
        00B8  A   0030
124     00B9      68BE        ADR,11,14                     ADD THE TWO DIGITS
125     00BA      E700        BRU           CONV1
        00BB  R   00A5
126     00BC      E7F0  CTMSG BLM,15        B:IOR
    M   00BD  X   0008
127     00BE  A   9000        DFC           #9000
```

```
128     00BF  R  00C5        DFC          BADNO
129     00C0     6C55        ZRR,5
130     00C1     E650        STM,5        B.STT
    M   00C2  X  0007
131     00C3     E700        BRU          E:SKD
    M   00C4  X  0006
132     00C5  A  0D0A  BADNO DFC          #0D0A,|INVALID CHAR, TASK ABORTED|
        00C6  A  494E
        00C7  A  5641
        00C8  A  4C49
        00C9  A  4420
        00CA  A  4348
        00CB  A  4152
        00CC  A  2C20
        00CD  A  5441
        00CE  A  534B
        00CF  A  2041
        00D0  A  424F
        00D1  A  5254
        00D2  A  4544
133     00D3  A  0D0A        DFC          #0D0A,#0000
        00D4  A  0000
134     00D5  A  0D0A  NUMBK DFC          #0D0A,|NO. OF BLOCKS TO BE CHECKED?|,0
        00D6  A  4E4F
        00D7  A  2E20
        00D8  A  4F46
        00D9  A  2042
        00DA  A  4C4F
        00DB  A  434B
        00DC  A  5320
        00DD  A  544F
        00DE  A  2042
        00DF  A  4520
        00E0  A  4348
        00E1  A  4543
        00E2  A  4B45
        00E3  A  443F
        00E4  A  0000
135     00E5  A  0D0A  X.VAL DFC          #0D0A,|FORMAT ERROR BIT 4|,#0D0A,0
        00E6  A  464F
        00E7  A  524D
        00E8  A  4154
        00E9  A  2045
        00EA  A  5252
        00EB  A  4F52
        00EC  A  2042
        00ED  A  4954
        00EE  A  2034
        00EF  A  0D0A
        00F0  A  0000
```

```
136     00F1  A  0D0A  FINSH DFC          #0D0A,|TASK COMPLETED|,#0D0A,0
        00F2  A  5441
        00F3  A  534B
        00F4  A  2043
        00F5  A  4F4D
        00F6  A  504C
        00F7  A  4554
        00F8  A  4544
        00F9  A  0D0A
        00FA  A  0000
137     00FB  A  0D0A  QUIT  DFC          #0D0A,|FORMAT CHECK TERMINATED |,#0D0A,0
        00FC  A  464F
        00FD  A  524D
        00FE  A  4154
        00FF  A  2043
        0100  A  4845
        0101  A  434B
        0102  A  2054
        0103  A  4552
        0104  A  4D49
        0105  A  4E41
        0106  A  5445
        0107  A  4420
        0108  A  0D0A
        0109  A  0000
138     010A  A  2031  TAB   DFC          | 1|
139     010B  A  2032        DFC          | 2|
140     010C  A  2034        DFC          | 4|
141     010D  A  2038        DFC          | 8|
142     010E  A  2041        DFC          | A|
143     010F  A  2042        DFC          | B|
144                    * THIS ROUTINE FILLS THE BIG BAD BUFFER WITH
145                    *   FRESH FUD.
146     0110     E7F0  F:TRD BLM,15       B:IOR
    M   0111  X  0008
147     0112  A  2000        DFC          #2000
148     0113  A  6176        DFC          MTBUF                START LOCATION
149     0114  A  1B80        DFC          7040
150     0115     6C33        ZRR,3
151     0116     E630        STM,3        F.MTP
        0117  R  0119
152     0118     FF07        BRX,7
153                    * RESET WORD POINTER
154           A  6176  MTBUF EQU          24950
155     0119  A  0000  F.MTP DFC          0
```

```
                        * F:USE IS THE USER PROGRAM THAT TRANSFERS
                        *   55 BYTE BLOCKS OUT OF THE BBB AND STORES
                        *   THEM IN THE FUDBF.
     011A       A510  F:USE SFM,1        FRS
     011B   R   015D
     011C       E530       LDM,3        F.MTP              MAG TAPE POINTER
     011D   R   0119
     011E       ED20       LDI,2        MTBUF
     011F   A   6176
     0120       EDD0       LDI,13       0
     0121   A   0000
     0122       EDC0       LDI,12       FUDBF
     0123   R   0141
     0124       6D63       TRR,6,3
     0125       E960       SUI,6        14080
     0126   A   3700
     0127       7660       TBRB,6,0     $+4
     0128   R   012B
     0129       E770       BLM,7        F:TRD
     012A   R   0110
     012B       AE72  USE  LBX,7,2
     012C       6D57       TRR,5,7                         SAVE ORIGINAL VALUE
     012D       E950       SUI,5        10                 CHECK FOR TEN
     012E   A   000A
     012F       7D55       TRRB,5,5     $+4                STORE ORIGINAL NO.
     0130   R   0133
     0131       AF5C       SBX,5,12                        STORE THE CONVERSION
     0132       F702       HOP,$+2
     0133       AF7C       SBX,7,12
     0134       603F       ABR,3,15                        INC MTPNT
     0135       60DF       ABR,13,15                       INC FUDBF POINT
     0136       6D6D       TRR,6,13                        SAVE R13
     0137       E960       SUI,6        55
     0138   A   0037
     0139       7660       TBRB,6,0     USE
     013A   R   012B
     013B       E630       STM,3        F.MTP
     013C   R   0119
     013D       AF6C       SBX,6,12
     013E       A410       LFM,1        FRS
     013F   R   015D
     0140       FF04       BRX,4                           RETURN
            R   0141  F.DBF EQU         $
     0141   A   0000  FUDBF RES         28,0
     015D   A   0000  FRS   RES         7,0
     0164               END

TOTAL ASSEMBLY ERRORS =  15    SIZE =   356
```

```
                                PGM          F$DMP
                                 INT          F:DMP,F:FST,F:BBT,F:TIM,F:DDD
                                 EXT          F.DBF,F:CHK,B:IOR,F:CVT,B.STT
                                 EXT          E:SKD,F:USE,E.35I,F.MTP
                          *      CAT NO.  400200-002
                          * THIS PROGRAM ENABLES THE OPERATOR TO DUMP
                          *   DR FUD DATA ONTO THE ASR 35 TTY IN A
                          *   USEABLE FORMAT.  HE CAN SPECIFY THE PARAM.
                          *   OF THE DUMP IN EITHER TIME OR NO. OF DATA
                          *   BLOCKS.
0000      7601  F:DMP TBRB,0,1      $+3            DESIRE NEW DATA?
0001  R   0003
0002      F705        HOP,$+5
0003      ED40        LDI,4         #3700
0004  A   3700
0005      E640        STM,4         F.MTP
0006  X   0009
0007      E700        BRU           F:FST          FIND START TIME
0008  R   00DD
0009      E680        STM,11        BLKBF
000A  R   00DC
000B      657F        LBR,7,15
000C      E740        BLM,4         F:CHK          CHECK FOR GOOD DATA
000D  X   0002
000E      F704        HOP,$+4
000F      6600        NOP
0010      E7E0  CLOOP BLM,14        F:DDD
0011  R   0024
0012      E520        LDM,2         BLKBF
0013  R   00DC
0014      7927        SURB,2,7      $+7            DONE ENOUGH YET
0015  R   001B
0016      6C55  CLOP1 ZRR,5
0017      E650        STM,5         B.STT
0018  X   0005
0019      E700        BRU           E:SKD
001A  X   0006
001B      E740        BLM,4         F:USE
001C  X   0007
001D      607F        ABR,7,15
001E      E740        BLM,4         F:CHK
001F  X   0002
0020      E700        BRU           CLOOP+2        BYPASS 2ND DUMP
0021  R   0012
0022      E700        BRU           CLOOP          DUMP ANOTHER BLOCK
0023  R   0010
0024      A510  F:DDD SFM,1         SVDDD
0025  R   00CF
0026      A5A0        SFM,10        SVDDD+7
0027  R   00D6
```

```
34    0028      ED10        LDI,1        3
      0029  A   0003
35    002A      E551        LDM,5,1      F.DBF          FIRST 2 DIGITS OF DOY
      002B  X   0001
36    002C      E850        ADI,5        #3030          CONVERT
      002D  A   3030
37    002E      E650        STM,5        HEADR+9
      002F  R   00A1
38    0030      EDA0        LDI,10       F.DBF
      0031  X   0001
39    0032      65BC        LBR,11,12
40    0033      AE5A        LBX,5,10                    LOAD 3RD DIGIT OF DOY
41    0034      0955        MBL,5,5
42    0035      E850        ADI,5        #3020          CONVERT
      0036  A   3020
43    0037      E650        STM,5        HEADR+10       PUT 3RD DIGIT DOY IN HEADR
      0038  R   00A2
44    0039      ED20        LDI,2        -3             SET UP FOR SIX DIGITS OF TIME
      003A  A   FFFD
45    003B      ED50        LDI,5        F.DBF
      003C  X   0001
46    003D      FD35  TIM1  LDX,3,5
47    003E      E830        ADI,3        #3030          CONVERT
      003F  A   3030
48    0040      E632        STM,3,2      HEADR+6        PUT DIGITS IN HEADR.
      0041  R   009E
49    0042      605F        ABR,5,15
50    0043      702F        ABRB,2,15    TIM1
      0044  R   003D
51    0045      EDB0        LDI,11       9              START GETTING THE DET NO.
      0046  A   0009
52    0047      EDC0        LDI,12       HEADR
      0048  R   0098
53    0049      EDD0        LDI,13       29              READY TO GO.
      004A  A   001D
54    004B      AE5A        LBX,5,10
55    004C      E850        ADI,5        #30
      004D  A   0030
56    004E      AF5C        SBX,5,12
57    004F      ED10        LDI,1        5
      0050  A   0005
58    0051      E551        LDM,5,1      F.DBF
      0052  X   0001
59    0053      E850        ADI,5        #3030          CONVERT
      0054  A   3030
60    0055      E650        STM,5        HEADR+15       STORE DET IN HEADR
      0056  R   00A7
61    0057      E7F0        BLM,15       B:IOR          OUTPUT HEADR.
      0058  X   0003
62    0059  A   9000        DFC          #9000
```

```
63    005A  R  0098        DFC          HEADR
64    005B     ED20        LDI,2        -32
      005C  A  FFE0
65    005D     EDB0        LDI,11       12
      005E  A  000C
66    005F     AE5A  LOOP  LBX,5,10                   LOAD BYTE FROM F.DBF
67    0060     0965        MBL,6,5                    SHIFT BYTE TO LEFT
68    0061     60BF        ABR,11,15                  MOVE TO NEXT BYTE
69    0062     AE5A        LBX,5,10                   LOAD NEXT BYTE
70    0063     6B65        ORR,6,5                    OR THE TWO REGISTERS
71    0064     E860        ADI,6        #3030         CONVERT
      0065  A  3030
72    0066     E662        STM,6,2      DATA+32       PUT IN PROPER PLACE IN DATA
      0067  R  00CA
73    0068     602F        ABR,2,15                   MOVE DATA POINTER ONE
74    0069     60BF        ABR,11,15                  MOVE TO NEXT BYTE
75    006A     AE6A        LBX,6,10                   LOAD IT
76    006B     E860        ADI,6        #2E30         CONVERT
      006C  A  2E30
77    006D     E662        STM,6,2      DATA+32
      006E  R  00CA
78    006F     602F        ABR,2,15                   MOVE DATA POINTER TWO WORDS
79    0070     60BF        ABR,11,15                  MOVE TO NEXT BYTE IN F.DBF
80    0071     AE5A        LBX,5,10
81    0072     E850        ADI,5        #2030
      0073  A  2030
82    0074     E652        STM,5,2      DATA+32
      0075  R  00CA
83    0076     602F        ABR,2,15
84    0077     60BF        ABR,11,15
85    0078     AE5A        LBX,5,10                   LOAD NEXT BYTE
86    0079     0955        MBL,5,5
87    007A     E850        ADI,5        #3020
      007B  A  3020
88    007C     E652        STM,5,2      DATA+32       STORE IN DATA
      007D  R  00CA
89    007E     60BF        ABR,11,15
90    007F     702F        ABRB,2,15    LOOP          FINISHED YET
      0080  R  005F
91    0081     ED60        LDI,6        -3
      0082  A  FFFD
92    0083     AE4A  DLOOP LBX,4,10
93    0084     60BF        ABR,11,15
94    0085     2844        RLD,4,4
95    0086     2D44        LLS,4,4
96    0087     2C44        LLD,4,4
97    0088     E840        ADI,4        #3030
      0089  A  3030
98    008A     E642        STM,4,2      DATA+32
      008B  R  00CA
```

```
 99     008C      602F        ABR,2,15
100     008D      706F        ABRB,6,15     DLOOP
        008E  R   0083
101     008F      E7F0        BLM,15        B:IOR          OUTPUT DATA INFORMATION
        0090  X   0003
102     0091  A   9000        DFC           #9000
103     0092  R   00AA        DFC           DATA
104     0093      A410        LFM,1         SVDDD
        0094  R   00CF
105     0095      A4A0        LFM,10        SVDDD+7
        0096  R   00D6
106     0097      FF0E        BRX,14
107     0098  A   0D0A  HEADR DFC           #0D0A,|TOD 123456  DOY 123 |
        0099  A   544F
        009A  A   4420
        009B  A   3132
        009C  A   3334
        009D  A   3536
        009E  A   2020
        009F  A   444F
        00A0  A   5920
        00A1  A   3132
        00A2  A   3320
108     00A3  A   2020        DFC           |   DET 515|,#0D0A,#0000
        00A4  A   2044
        00A5  A   4554
        00A6  A   2035
        00A7  A   3135
        00A8  A   0D0A
        00A9  A   0000
109     00AA  A   5050  DATA  DFC           |PP.P AA PP.P AA PP.P AA |
        00AB  A   2E50
        00AC  A   2041
        00AD  A   4120
        00AE  A   5050
        00AF  A   2E50
        00B0  A   2041
        00B1  A   4120
        00B2  A   5050
        00B3  A   2E50
        00B4  A   2041
        00B5  A   4120
110     00B6  A   5050        DFC           |PP.P AA PP.P AA PP.P AA |
        00B7  A   2E50
        00B8  A   2041
        00B9  A   4120
        00BA  A   5050
        00BB  A   2E50
        00BC  A   2041
        00BD  A   4120
```

```
        00BE  A  5050
        00BF  A  2E50
        00C0  A  2041
        00C1  A  4120
111     00C2  A  5050        DFC          |PP.P AA PP.P AA 313234|,#0D0A,0
        00C3  A  2E50
        00C4  A  2041
        00C5  A  4120
        00C6  A  5050
        00C7  A  2E50
        00C8  A  2041
        00C9  A  4120
        00CA  A  3331
        00CB  A  3332
        00CC  A  3334
        00CD  A  0D0A
        00CE  A  0000
112     00CF  A  0000  SVDDD RES    13,0
113     00DC  A  0000  BLKBF RES    1,0
114                    ************************************************************
```

```
                        ***********************************************************
                        * THIS PROGRAM SETS THE DRFUD TAPE TO THE
                        *   DESIRED START TIME AND GIVES THE OPERATOR
                        *   THE OPTIONS OF USING:
                        *     1.  START TIME AND STOP TIME.
                        *     2.  START TIME AND NUMBER OF DATA BLOCKS.
                        *     3.  START IMMEDIATE AND NUMBER OF DATA BLOCKS.
 00DD       E7F0  F:FST BLM,15       B:IOR          REQUEST OPER. TO SPECIFY
 00DE   X   0003
 00DF   A   5000       DFC           #5000           ONE OF THE ABOVE OPTIONS.
 00E0   R   0145       DFC           OPTS
                        * RE-ENTRY HERE AFTER OPERATORS RESPONSE
 00E1       E510       LDM,1         E.35I          GET HIS REQUEST
 00E2   X   0008
 00E3       6D51       TRR,5,1
 00E4       ED60       LDI,6         #33
 00E5   A   0033
 00E6       7956       SURB,5,6      TIM            HE WANTS A START TIME HUH!
 00E7   R   00F2
 00E8       E740  BLOCK BLM,4        F:USE
 00E9   X   0007
 00EA       E7F0       BLM,15        B:IOR          REQUEST NO. OF BLOCKS
 00EB   X   0003
 00EC   A   5000       DFC           #5000
 00ED   R   0159       DFC           NOBLK
                        * RE-ENTRY AFTER RESPONSE, CONVERT TO BINARY
                        *   AND HOLD IN BLKBF.
 00EE       E740       BLM,4         F:CVT
 00EF   X   0004
 00F0       E700       BRU           F:DMP+9
 00F1   R   0009
 00F2       E7F0  TIM  BLM,15        B:IOR          REQUEST START TIME
 00F3   X   0003
 00F4   A   5000       DFC           #5000
 00F5   R   0169       DFC           TIME
 00F6       E7F0       BLM,15        RFC
 00F7   R   0112
 00F8       E740       BLM,4         F:TIM          FIND CORRECT TIME ON TAPE
 00F9   R   01B8
 00FA       ED60       LDI,6         #31
 00FB   A   0031
 00FC       7916       SURB,1,6      BLOCK+2        STOP TIME OR NO. OF BLOCKS
 00FD   R   00EA
 00FE       E7F0       BLM,15        B:IOR          REQUEST STOP TIME
 00FF   X   0003
 0100   A   5000       DFC           #5000
 0101   R   0179       DFC           QUIT           CANNED MSG.
 0102       E7F0       BLM,15        RFC
 0103   R   0112
 0104       E740       BLM,4         PACK           GO GET RESPONSE
```

```
        0105  R  01A7
151     0106     E7F0        BLM,15        F:BBT
        0107  R  026E
152     0108  R  019A        DFC           T.MBF
153     0109     E540        LDM,4         NGSTR
        010A  R  026C
154     010B     E550        LDM,5         NGSTR+1
        010C  R  026D
155     010D     224C        DAR,4,12
156     010E     E650        STM,5         BLKBF
        010F  R  00DC
157     0110     E700        BRU           F:DMP+11
        0111  R  000B
158                       * CANNED OUTPUT MESS, BUFFERS, AND FORMAT CHECKER.
159     0112     A510  RFC   SFM,1         RFCRS
        0113  R  01A0
160     0114     ED20        LDI,2         E.35I
        0115  X  0008
161     0116     ED30        LDI,3         -3
        0117  A  FFFD
162     0118     FD42  RFC1  LDX,4,2
163     0119     E940        SUI,4         #30
        011A  A  0030
164     011B     7640        TBRB,4,0      BADTM
        011C  R  013F
165     011D     E940        SUI,4         #10
        011E  A  0010
166     011F     7640        TBRB,4,0      $+4
        0120  R  0123
167     0121     E700        BRU           BADTM
        0122  R  013F
168     0123     602F        ABR,2,15
169     0124     703F        ABRB,3,15     RFC1
        0125  R  0118
170     0126     FD42        LDX,4,2
171     0127     E940        SUI,4         #20
        0128  A  0020
172     0129     7D44        TRRB,4,4      BADTM
        012A  R  013F
173     012B     602F        ABR,2,15
174     012C     ED30        LDI,3         -6
        012D  A  FFFA
175     012E     FD42  RFC2  LDX,4,2
176     012F     E940        SUI,4         #30
        0130  A  0030
177     0131     7640        TBRB,4,0      BADTM
        0132  R  013F
178     0133     E940        SUI,4         #10
        0134  A  0010
179     0135     7640        TBRB,4,0      $+4
```

```
        0136  R  0139
180     0137     E700        BRU          BADTM
        0138  R  013F
181     0139     602F        ABR,2,15
182     013A     703F        ABRB,3,15    RFC2
        013B  R  012E
183     013C     A410        LFM,1        RFCRS
        013D  R  01A0
184     013E     FF0F        BRX,15
185     013F     E7F0  BADTM BLM,15       B:IOR
        0140  X  0003
186     0141  A  9000        DFC          #9000
187     0142  R  0188        DFC          FORM
188     0143     E700        BRU          CLOP1
        0144  R  0016
189     0145  A  0D0A  OPTS  DFC          #0D0A,|SPECIFY ACTION DESIRED, 1, 2, OR 3. |,0
        0146  A  5350
        0147  A  4543
        0148  A  4946
        0149  A  5920
        014A  A  4143
        014B  A  5449
        014C  A  4F4E
        014D  A  2044
        014E  A  4553
        014F  A  4952
        0150  A  4544
        0151  A  2C20
        0152  A  312C
        0153  A  2032
        0154  A  2C20
        0155  A  4F52
        0156  A  2033
        0157  A  2E20
        0158  A  0000
190     0159  A  0D0A  NOBLK DFC          #0D0A,|NO. OF BLOCKS TO BE DUMPED. |,0
        015A  A  4E4F
        015B  A  2E20
        015C  A  4F46
        015D  A  2042
        015E  A  4C4F
        015F  A  434B
        0160  A  5320
        0161  A  544F
        0162  A  2042
        0163  A  4520
        0164  A  4455
        0165  A  4D50
        0166  A  4544
        0167  A  2E20
```

```
        0168  A  0000
191     0169  A  0D0A  TIME  DFC          #0D0A,|SPECIFY START TIME DESIRED. |,0
        016A  A  5350
        016B  A  4543
        016C  A  4946
        016D  A  5920
        016E  A  5354
        016F  A  4152
        0170  A  5420
        0171  A  5449
        0172  A  4D45
        0173  A  2044
        0174  A  4553
        0175  A  4952
        0176  A  4544
        0177  A  2E20
        0178  A  0000
192     0179  A  0D0A  QUIT  DFC          #0D0A,|SPECIFY STOP TIME DESIRED.|,0
        017A  A  5350
        017B  A  4543
        017C  A  4946
        017D  A  5920
        017E  A  5354
        017F  A  4F50
        0180  A  2054
        0181  A  494D
        0182  A  4520
        0183  A  4445
        0184  A  5349
        0185  A  5245
        0186  A  442E
        0187  A  0000
193     0188  A  0D0A  FORM  DFC          #0D0A,|INVALID FORMAT ON |
        0189  A  494E
        018A  A  5641
        018B  A  4C49
        018C  A  4420
        018D  A  464F
        018E  A  524D
        018F  A  4154
        0190  A  204F
        0191  A  4E20
194     0192  A  5449        DFC          |TIME REQUEST|,#0D0A,0
        0193  A  4D45
        0194  A  2052
        0195  A  4551
        0196  A  5545
        0197  A  5354
        0198  A  0D0A
        0199  A  0000
```

```
195     019A  A  0000  T.MBF RES          6,0
196     01A0  A  0000  RFCRS RES          7,0
197                    * CHANGE OPERATOR RESPONSE TO BCD AND PUT INTO T.MBF IN A FORMAT
198                    *   COMPATABLE WITH F.DBF.
199                    *      |123 123456 IS REPACKED TO 123456 DROP DOY|
200     01A7     651D  PACK  LBR,1,13
201     01A8     ED70        LDI,7         -3
        01A9  A  FFFD
202     01AA     E531        LDM,3,1       E.35I          TENS OF HOURS
        01AB  X  0008
203     01AC     0933        MBL,3,3
204     01AD     601F        ABR,1,15
205     01AE     E331        ORM,3,1       E.35I          UNITS OF HOURS
        01AF  X  0008
206     01B0     E930        SUI,3         #3030
        01B1  A  3030
207     01B2     E637        STM,3,7       T.MBF+3
        01B3  R  019D
208     01B4     601F        ABR,1,15
209     01B5     707F        ABRB,7,15     PACK+3
        01B6  R  01AA
210     01B7     FF04        BRX,4                        RETURN
211     01B8     A510  F:TIM SFM,1         SAVER
        01B9  R  0265
212     01BA     ED20        LDI,2         #A
        01BB  A  000A
213     01BC     E550        LDM,5         E.35I          GET HOD.
        01BD  X  0008
214     01BE     E950        SUI,5         #30
        01BF  A  0030
215     01C0     2042        MPR,4,2                      X 10
216     01C1     651F        LBR,1,15
217     01C2     E561        LDM,6,1       E.35I          GET TOD
        01C3  X  0008
218     01C4     E960        SUI,6         #30
        01C5  A  0030
219     01C6     6856        ADR,5,6
220     01C7     601F        ABR,1,15
221     01C8     E561        LDM,6,1       E.35I          GET UOD
        01C9  X  0008
222     01CA     E960        SUI,6         #30
        01CB  A  0030
223     01CC     2042        MPR,4,2
224     01CD     6856        ADR,5,6                      RESULT IN R5
225     01CE     F650        STM,5         OPDOY          SAVE RESULT
        01CF  R  0264
226     01D0     E740        BLM,4         PACK           REPACK OPERATOR RESPONSE
        01D1  R  01A7
227     01D2     E7F0        BLM,15        F:BBT          CONVERT IT TO BIN
        01D3  R  026E
```

```
228     01D4  R  019A        DFC          T.MBF
229     01D5     6FDD        TTR,13,13
230     01D6     0DCC        TOR,12,12
231     01D7     7DDD        TRRB,13,13   $+3
        01D8  R  01DA
232     01D9     60CF        ABR,12,15
233     01DA     E6C0        STM,12       NGSTR
        01DB  R  026C
234     01DC     E6D0        STM,13       NGSTR+1
        01DD  R  026D
235     01DE     E740        BLM,4        F:USE
        01DF  X  0007
236     01E0     E740        BLM,4        F:CHK
        01E1  X  0002
237     01E2     E700        BRU          NOGO            BAD FORMAT ON FUD
        01E3  R  0292
238                       * CONVERT F.DBF DOY TO BIN FOR COMPARISON
239     01E4     ED20      FDOY  LDI,2        #A             R2=10
        01E5  A  000A
240     01E6     ED10        LDI,1        3
        01E7  A  0003
241     01E8     E561        LDM,6,1      F.DBF          GET DOY
        01E9  X  0001
242     01EA     0856        MBR,5,6                     GET HOD IN R4
243     01EB     0C66        MLR,6,6                     GET ONLY TOD IN R6
244     01EC     2042        MPR,4,2                     MULT R4 X 10
245     01ED     6856        ADR,5,6                     ADD RESULT TO R6
246     01EE     601F        ABR,1,15
247     01EF     E561        LDM,6,1      F.DBF          GET UOD AND PART OF DET
        01F0  X  0001
248     01F1     0866        MBR,6,6                     GET RID OF DET
249     01F2     2042        MPR,4,2
250     01F3     6856        ADR,5,6
251     01F4     E560        LDM,6        CPDOY
        01F5  R  0264
252     01F6     7956        SURB,5,6     GOON3          COMPARE TWO DOYS
        01F7  R  0216
253     01F8     E7F0      CRAP  BLM,15       F:BBT
        01F9  R  026E
254     01FA  X  0001        DFC          F.DBF
255                       * BOTH TIMES ARE NOW IN BINARY, DO A DOUBLE PRECISION
256                       *   SUBTRACT AND SEE HOW THEY COMPARE.
257     01FB     E540        LDM,4        NGSTR
        01FC  R  026C
258     01FD     E550        LDM,5        NGSTR+1
        01FE  R  026D
259     01FF     224C        DAR,4,12
260     0200     7D44        TRRB,4,4     GOON
        0201  R  0207
261     0202     7D55        TRRB,5,5     GOON
```

```
        0203  R  0207
262     0204     A410        LFM,1        SAVER          GET REGISTERS
        0205  R  0265
263     0206     FF04        BRX,4                       RETURN AND DUMP
264     0207     7640  GOON  TBRB,4,0     GOON1          NEG. READ ANOTHER BLOCK
        0208  R  0212
265     0209     E7F0        BLM,15       B:IOR          TELL OPERATOR HE HAS
        020A  X  0003
266     020B  A  9000        DFC          #9000           GONE TOO FAR
267     020C  R  0225        DFC          PASTT
268     020D     6C55        ZRR,5
269     020E     E650        STM,5        B.STT
        020F  X  0005
270     0210     E700        BRU          E:SKD
        0211  X  0006
271     0212     E740  GOON1 BLM,4        F:USE         READ ANOTHER BLOCK
        0213  X  0007
272     0214     E700        BRU          CRAP
        0215  R  01F8
273     0216     7650  GOON3 TBRB,5,0     GOON4
        0217  R  0221
274     0218     E7F0        BLM,15       B:IOR
        0219  X  0003
275     021A  A  9000        DFC          #9000
276     021B  R  0238        DFC          PASTD
277     021C     6C55        ZRR,5
278     021D     E650        STM,5        B.STT
        021E  X  0005
279     021F     E700        BRU          E:SKD
        0220  X  0006
280     0221     E740  GOON4 BLM,4        F:USE
        0222  X  0007
281     0223     E700        BRU          FDOY
        0224  R  01E4
282     0225  A  0D0A  PASTT DFC          #0D0A,|FUD TAPE POSITIONED PAST|
        0226  A  4655
        0227  A  4420
        0228  A  5441
        0229  A  5045
        022A  A  2050
        022B  A  4F53
        022C  A  4954
        022D  A  494F
        022E  A  4E45
        022F  A  4420
        0230  A  5041
        0231  A  5354
283     0232  A  2054        DFC          | TIME DESIRED.|,#0D0A,0
        0233  A  494D
        0234  A  4520
```

```
        0235  A  4445
        0236  A  5349
        0237  A  5245
        0238  A  442F
        0239  A  0D0A
        023A  A  0000
284     023B  A  0D0A  PASTC DFC          #0D0A,|FUD TAPE POSITIONED PAST|
        023C  A  4655
        023D  A  4420
        023E  A  5441
        023F  A  5045
        0240  A  2050
        0241  A  4F53
        0242  A  4954
        0243  A  494F
        0244  A  4E45
        0245  A  4420
        0246  A  5041
        0247  A  5354
285     0248  A  2044        DFC          | DAY DESIPED. |,#0D0A,0
        0249  A  4159
        024A  A  2044
        024B  A  4553
        024C  A  4952
        024D  A  4544
        024E  A  2E20
        024F  A  0D0A
        0250  A  0000
286     0251  A  0D0A  NOG01 DFC          #0D0A,|SEARCH ABORTED DUE TO |
        0252  A  5345
        0253  A  4152
        0254  A  4348
        0255  A  2041
        0256  A  424F
        0257  A  5254
        0258  A  4544
        0259  A  2044
        025A  A  5545
        025B  A  2054
        025C  A  4F20
287     025D  A  464F        DFC          |FORMAT ERROR|,0
        025E  A  524D
        025F  A  4154
        0260  A  2045
        0261  A  5252
        0262  A  4F52
        0263  A  0000
288     0264  A  0000  OPDOY RES          1,0
289     0265  A  0000  SAVER RES          7,0
290     026C  A  0000  NGSTR RES          2,0
```

```
                        ************************************************************
                        * F:BBT CONVERTS BCD TO BINARY TIME
                        *   CALLING SEQUENCE*
                        *     BLM,15          F:BBT
                        *     DFC             (ADDR OFFIRST BCD WORD)
                        * RETURN WITH BINARY EQUIVALENT IN R12 AND R13
     026E       A510   F:BBT SFM,1           BBTSV
     026F   R   028B
     0270       FD7F         LDX,7,15                        PARM. LOC.
     0271       60FF         ABR,15,15                       MODIFY RET. ADDR.
     0272       ED10         LDI,1           #A
     0273   A   000A
     0274       ED20         LDI,2           #6
     0275   A   0006
     0276       6CDD         ZRR,13
     0277       ED30         LDI,3           -3
     0278   A   FFFD
     0279       FD57   BBT01 LDX,5,7                         NEXT WORD
     027A       607F         ABR,7,15
     027B       0845         MBR,4,5
     027C       68D4         ADR,13,4
     027D       20C1         MPR,12,1
     027E       0C55         MLR,5,5
     027F       703F         ABRB,3,15       $+3
     0280   R   0282
     0281       F705         HOP,BBT02
     0282       68D5         ADR,13,5
     0283       20C2         MPR,12,2
     0284       E700         BRU             BBT01
     0285   R   0279
     0286       6C44   BBT02 ZRR,4
     0287       22C4         DAR,12,4
     0288       A410         LFM,1           BBTSV
     0289   R   028B
     028A       FF0F         BRX,15
     028B   A   0000   BBTSV RES             7,0
                        * TIME SEARCH ABORT
     0292       E7F0   NOGO  BLM,15          B:IOR
     0293   X   0003
     0294   A   9000         DFC             #9000
     0295   R   0251         DFC             NOGO1
     0296       E700         BRU             CLOP1
     0297   R   0016
     0298                    END

TOTAL ASSEMBLY ERRORS =   0    SIZE =   664
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FORM NBS-114A (1-71)

U.S. DEPT. OF COMM. BIBLIOGRAPHIC DATA SHEET	1. PUBLICATION OR REPORT NO. NBSIR 73-235	2. Gov't Accession No.	3. Recipient's Accession No.

4. TITLE AND SUBTITLE
FIELD SERVICE TEST MODEL: COMPUTER-CONTROLLED U SYSTEM OPERATIONS MANUAL AND SOFTWARE OPERATING SYSTEM APPENDICES FOR THE AUTOMATED SYSTEM VOLUME II

5. Publication Date

6. Performing Organization Code

7. AUTHOR(S)
K. M. Gray and J. R. Ellis

8. Performing Organization
NBSIR 73-235

9. PERFORMING ORGANIZATION NAME AND ADDRESS
NATIONAL BUREAU OF STANDARDS
DEPARTMENT OF COMMERCE
WASHINGTON, D.C. 20234

10. Project/Task/Work Unit No.
6505413

11. Contract/Grant No.
AFTAC T/2301/U/NBS

12. Sponsoring Organization Name and Address
Department of the Air Force
HQ USAF (AFTAC/TAP)
Patrick A.F.B., Florida 32925

13. Type of Report & Period Covered
Instruction Manual

14. Sponsoring Agency Code

15. SUPPLEMENTARY NOTES

16. ABSTRACT (A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)

Volume II of the "Automated U System" describes the software listings and the operator's manual. This volume is intended to instruct the station technician in the procedure to load programs and operate, under computer control, the automated U system.

17. KEY WORDS (Alphabetical order, separated by semicolons)
Operating system; program listings; software utilization

18. AVAILABILITY STATEMENT	19. SECURITY CLASS (THIS REPORT)	21. NO. OF PAGES
[ ] UNLIMITED.	UNCLASSIFIED	
[X] FOR OFFICIAL DISTRIBUTION. DO NOT RELEASE TO NTIS.	20. SECURITY CLASS (THIS PAGE) UNCLASSIFIED	22. Price

USCOMM-DC 66244-P71

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